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BASELINE REPORT ON WATER POLLUTION
ST. JOHNS RIVER BASIN

PUBLIC HEALTH SERVICE
ATLANTA, GEORGIA

PREPARED FOR
FLORIDA STATE BOARD OF HEALTH
JACKSONVILLE, FLORIDA

1951

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REPORT ON WATER POLLUTION

ST. JOHNS RIVER

FLORIDA

PRELIMINARY DRAFT OF PROPOSED REPORT

1951

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
WATER POLLUTION CONTROL DIVISION

In Cooperation With

THE FLORIDA STATE BOARD OF HEALTH

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BASELINE REPORT ON WATER POLLUTION

St. Johns River Basin

1951

Prepared by:

Southeast Drainage Basins Office
Division of Water Pollution Control
Public Health Service, Federal Security Agency

on the basis of information supplied by
the Florida State Board of Health

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INTRODUCTION

The Federal Water Pollution Control Act, Public Law 845, passed by the 80th Congress in June of 1948, requires the Surgeon General of the Public Health Service to cooperate with other Federal agencies, with State and interstate water pollution control agencies, and with municipalities and industries in the preparation or adoption of comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof, and improving the sanitary condition of surface and underground waters.

In developing these programs, due regard must be given to improvements necessary to conserve the Nation's waters for public water supplies, propagation of fish and aquatic live, recreational purposes, agricultural, industrial, and other legitimate uses.

Recognizing the fact that full technical information was not available to permit the development of such comprehensive programs immediately for most of the Nation's waters, the Public Health Service envisioned the development of these programs in two general phases.

The first phase contemplated the development of a series of reports, consistent with presently available data, which would: provide a reference point for measuring progress; provide a guide to needed additional data; provide a basis for the logical development of comprehensive programs; provide a basis for approval of loans to States, interstate agencies and municipalities at such time as the Congress made available funds for this purpose; and serve to inform the public on the problem of water pollution and set forth suggestions for pollution control.

The collection of available data as of June 1, 1951, has been completed under the first phase of the program. Such data have been assembled with the cooperation of the Bureau of Sanitary Engineering, Florida State Board of Health. Through this agency additional data have been obtained from other State officials, county and city officials and representatives of industry. Federal agencies also have been of great assistance.

These baseline reports present information about the ways our water resources are used, the pollution

going into our water resources and the resulting damages, the benefits which may result from pollution prevention and abatement, the pollution prevention measures now in effect, and those required.

Since the baseline reports are based on data which are now readily available, these reports do not discuss or evaluate the most advantageous water uses as they are related to pollution control. Such considerations will be included as a part of the comprehensive water pollution control programs.

The deficiencies in data and the gaps in information indicated in these baseline reports are as significant as the presentation of available facts and statistics. They indicate the work which still needs to be accomplished by water pollution control authorities for the preparation of comprehensive programs.

Data and knowledge now available are sufficient, however, to permit the immediate solution of many of the pollution problems within the St. Johns River Basin without awaiting the results of additional surveys and studies. The tabulations of pollution abatement projects represent presently known needs. However, future

studies and evaluations may result in some changes in the estimations of requirements.

A sincere effort has been made by all who contributed to this report to present a fair picture of the complex water pollution problems in the St. Johns River Basin and to present reasonable conclusions and recommendations. It is hoped that this report, as a step in the cooperative development of an ultimate comprehensive pollution control program, will help in safeguarding the water resources of the St. Johns River Basin.

ACKNOWLEDGMENTS

The Public Health Service wishes to acknowledge the cooperation and assistance of those agencies and individuals which have contributed to the preparation of this report.

The Florida State Board of Health has furnished the data from which the various tables were prepared, unless otherwise credited, and other information contained in the narrative. This agency also has reviewed the preliminary draft of the report and has offered valuable comments and suggested changes. In general, the preliminary draft has been revised so that the report is in agreement with the comments and suggestions of the State Agency.

Special recognition is given to use of data obtained from the Florida Game and Fresh Water Fish Commission and for its review of the preliminary draft of the report.

Federal agencies from which assistance was obtained include the Corps of Engineers of the Department of Army, and the Fish and Wildlife Service and

Geological Survey of the Department of Interior.

Finally, there is acknowledged the assistance of other State agencies and individuals interested in water resources development and conservation who have contributed information.

SUMMARY

The St. Johns River Basin, Florida's most important river, comprises an area of 7,612 square miles and lies entirely within the State. The river arises in the great grassy plain about 25 miles inland from the Florida east coast, some 50 miles north of Lake Okeechobee, and flows north through a series of lakes for 257 miles to Jacksonville, thence east 26 miles to the Atlantic Ocean.

The preliminary 1950 population for the St. Johns River Basin is 580,710, an increase of 28 percent over the 1940 population. The basin contains 14 urban communities which comprise 61 percent of the total population. The largest of these is Jacksonville having an estimated population of 200,000.

The basic economy of the basin is founded on the land and in industries based upon agriculture. The value of farm production in 1945 has been estimated at nearly 53 million dollars. The most valuable single farm product is citrus fruit.

Industry is expanding rapidly within the basin.

In 1948 there were 811 manufacturing industries, an increase of 60 percent over the number present in 1939. The fastest growing industry in the years 1948-1950 was the canning industry, the greatest proportion of which was devoted to canning of citrus products. Other important industries are based on the raw materials supplied by extensive forests which are estimated to occupy 74 percent of the total area of the basin.

The water resources of the basin are plentiful. They are used primarily for domestic and industrial water supply, navigation, commercial fishing, recreation, livestock watering, irrigation, propagation and over-wintering of waterfowl, and the maintaining of ground water levels throughout the area. The water resources are not currently used to their utmost. There is an adequate quantity of water, both ground and surface, to sustain extensive additional industrial expansion, population growth, recreational development and other legitimate uses provided the water resources can be guarded against pollution.

The area is part of one of the nation's most popular playgrounds. The mild year around climate,

natural beauty of the area, and the recreation offered by the lakes, rivers, and beaches, are important to the tourist. The business of caring for vacationists is one of the leading business enterprises of the basin. There are almost unlimited potentialities for expanding recreational facilities.

There are 43 municipalities and 123 industries which discharge pollution directly to the watercourses of the basin. The reported organic pollution load discharged from 41 municipalities and 27 industries for which data is available has a population equivalent of approximately a half million people. This figure does not include wastes of unknown strength and volume from one municipal source, from 96 industries discharging wastes directly to watercourses, nor from approximately 60 industries discharging wastes through municipal sewers.

The surface waters of the basin are not extensively damaged by pollution because of the large volumes of water available for dilution and because a large proportion of both municipal and industrial wastes are discharged to underground caverns in the porous limestone

strata. There are, however, a number of local areas where pollution is a serious problem.

The subsurface disposal of municipal and industrial wastes is damaging the ground water resources. This practice results in a definite health hazzard as well as lowering the quality of water for industrial use. It is one of the most critical problems of the basin.

Citrus canning, concentrating and/or processing plants constitute the most severe industrial waste problem within the basin because of the ever increasing number of plants and the lack of knowledge of an economical method of treatment of the wastes.

A summary of pollution control measures in effect shows that of the 42 municipalities which are sources of pollution, 10 have primary treatment plants and 21 provide secondary treatment. Twelve municipalities provide no treatment. One of these latter is Jacksonville which has a sewered population of 170,000. Approximately 35 percent of the municipal sewage (based on population served) receives treatment. Of 123 industries which discharge wastes directly to watercourses,

90 percent provide no treatment.* The capacity of 79 percent of the municipal waste treatment plants and the operation of 88 percent are considered satisfactory. The adequacy with relation to capacity and operation of three (30 percent) of the industrial waste treatment facilities is considered adequate.

Good progress has been made in the construction of municipal waste treatment facilities. In the period 1947 through 1950 a total of 21 municipal sewage treatment facilities were completed which were designed to serve a population of 194,000. Three additional plants designed to serve 1,400 people were completed during the first half of 1951. Construction is currently underway on one new plant designed to serve 50,000 people and on an enlargement of another plant.

No new industrial waste treatment facilities were constructed during the period 1947-1948. However, six were constructed during the years 1949-1950. During the first half of 1951 four additional industrial waste

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* Septic tanks are not considered as treatment for the purposes of this report.

treatment facilities were built.

Pollution prevention requirements include 14 new municipal treatment plants and enlargements or additions to two others to serve a combined population of 220,300, and new treatment plants or other pollution control measures at eight industries. The requirements at 108 other industries are undetermined. It is estimated that the initial cost of required municipal treatment facilities will be approximately $21,509,400 ($9,777,000 for new treatment plants and $11,732,400 for intercepting sewers). Based on very limited data, it is expected that the initial costs of industrial waste treatment at the eight industries discharging wastes directly to watercourses where pollution abatement needs are known will be between $500,000 and $840,000. The total initial cost of required municipal and industrial waste treatment facilities, including necessary intercepting sewers but excluding collecting systems, is estimated to be between $22,000,000 and $23,000,000.

CONCLUSIONS

1. The St. Johns River Basin is rich in natural resources including fertile lands, large forests, wildlife, and an abundance of water. The water resources of the basin are used primarily for: public and industrial water supplies, agriculture, recreation, navigation, commercial fishing, and waste disposal.

2. The waters of the basin are not currently used to their utmost. There is an adequate quantity of water, both ground and surface, to sustain extensive additional industrial expansion, population growth, recreational development and other legitimate uses provided all water uses are considered in the development of any comprehensive water pollution control program.

3. The surface waters of the basin are not extensively damaged by pollution. In some local areas the water resources have been damaged. These areas include: Moncrief Creek, Ribault River, Rice Creek and local areas in the vicinity of

Jacksonville, Green Cove Springs, Palatka, Sanford, and Winter Garden.

4. Domestic pollution limits the development of oystering at the mouth of the St. Johns River.

5. Municipal pollution is limiting recreational uses in the vicinity of Mt. Dora, Eustis, Sanford, and recreational uses and property values in limited areas at Jacksonville. The damage is more esthetic than biological and is due to odors, water discoloration, and floating refuse, although bacterial contamination is a factor.

6. Esthetic values of the water resources are extremely important. Full benefit to the basin of a large annual influx of tourists is dependent upon maintaining clean waters of high esthetic and recreational value.

7. Subsurface disposal of municipal and industrial wastes is damaging the ground water resources of the basin. This practice results in a definite health hazzard as well as in lowering the quality of water for industrial use. It is one of the most critical problems in the basin.

The problem is recognized by the State Board of Health. Corrective measures have been taken at Orlando and Ocala, and additional corrective measures are being taken at Gainesville, by the construction of municipal sewage disposal plants designed to include most industrial wastes.

8. Citrus canning, concentrate and processing plants constitute the most serious industrial problem in the basin because of their rapidly increasing number and the lack of an economical method of treating their wastes. The problem is recognized by the State Board of Health which is conducting a limited survey of the citrus utilizing industries in the State in order to more accurately evaluate the problem.

9. Industry has not kept pace with municipalities in the abatement of pollution. Seventy-two percent of sewered municipalities provide some degree of sewage treatment as compared with approximately nine percent of industries which contribute waste directly to watercourses or to subsurface drainage. Although 39 percent of the

industries have septic tanks for domestic and/or industrial wastes, this is not considered effective treatment by the Bureau of Sanitary Engineering, Florida State Board of Health, and those industries are considered in this report as providing no treatment.

10. Both population and industrial development are increasing very rapidly in the basin. These trends are toward greater water use. To adequately protect the water resources of the basin for future use, steps must be taken to eliminate existing pollution, and to insure that future industries provide the proper waste treatment.

11. Unsatisfactory operation and/or lack of maintenance has reduced the efficiency of nine percent of the existing municipal sewage treatment plants as reported in Table E. The capacity of 18 percent of the plants is reported as unsatisfactory.

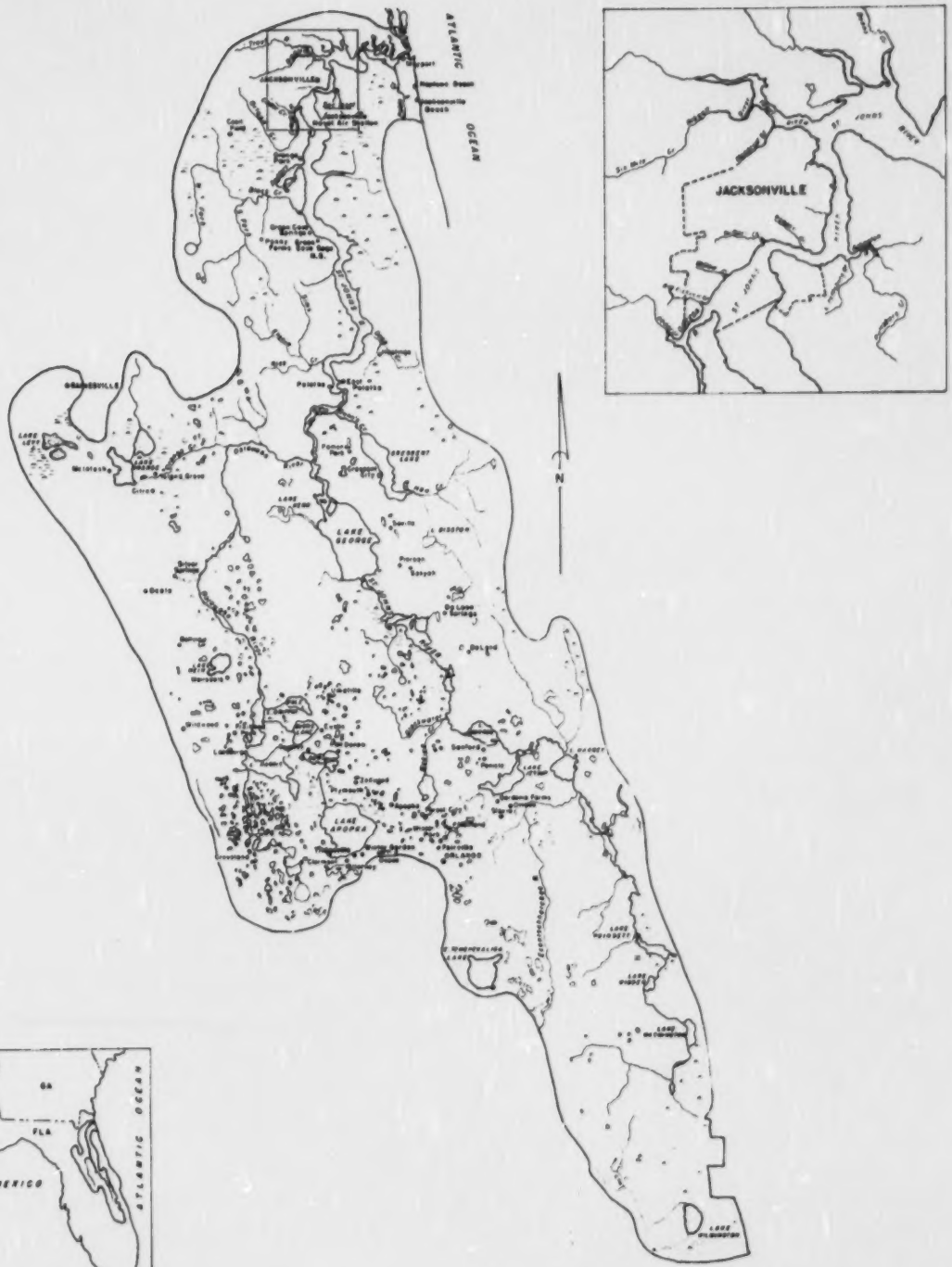
12. Good progress has been made in the construction of municipal pollution abatement facilities since 1947 with a total of 24 being newly

constructed or improved to June 1, 1951. These plants serve 78,564 people, or 26 percent of the sewered population of the basin. The construction of four other plants presently planned or nearing completion will add nearly 25,000 additional population to this figure.

RECOMMENDATIONS

It is recommended that:

1. The City of Jacksonville develop plans and proceed with the construction of municipal sewage treatment facilities.
2. The practice of discharging wastes into subsurface drainage be stopped and that adequate treatment be provided for all wastes before their discharge to surface drainage systems.
3. Industry adequately treat its own wastes where access to municipal sewers is denied or is not available.
4. Research work on citrus waste be accelerated to develop the most economical means of satisfactory waste treatment and/or their disposal through by-product manufacture.
5. Comprehensive water quality standards be established for all the waters of the basin to control existing waste discharges and govern future domestic and industrial waste treatment development.



ST. JOHNS RIVER BASIN

GENERAL REFERENCE MAP

FEDERAL SECURITY AGENCY

Public Health Service

DIVISION OF WATER POLLUTION CONTROL

MAP NO. 1

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Something wrong here! Page 20 should be the first page of Historical Background, according to the Table of Contents. CHH 9/7/51

state compacts. There are no inter-state compacts between the States of Southeast Drainage Basins. Inter-state compacts are desirable and would facilitate the development of comprehensive programs for the 22 inter-state river systems in the basin.

A program of public education is needed through out the basins to present the advantages of, and the necessity for pollution abatement.

On the basis of available data, which are admittedly incomplete, the initial construction costs of new plants and the enlarging or replacing of existing plants, where municipal requirements for proper treatment are now known, are estimated to be $108,000,000. This estimate does not include funds needed for the construction of waste treatment facilities for municipal sources of pollution for which the requirements are undetermined, nor any money for the construction of industrial waste treatment works, required for the abatement of industrial pollution.

The lack of data as to the amounts of pollution discharged to the watercourses from 428 municipal sources of pollution and as to the types and amounts of industrial wastes discharged from the 1,108 industrial plants makes it difficult to estimate the construction cost of all treatment work required to

named in honor of General Andrew Jackson who lead the campaign against the Indians. Jacksonville, which has grown into a large commercial metropolis, developed from a small settlement located at an Indian fording place near the mouth of the St. Johns River. The Indians called the place, "Wacca Pilatka", meaning "ford for cows".

When the English acquired Florida in 1763, they built a Kings Road from St. Augustine into Georgia which crossed the river at this ford. The tiny community was renamed "Cowford" and was generally known by that name until the present name was chosen. Other early settlements in the area were Palatka founded in 1821, and Mayport and Green Cove Springs which were settled in 1830.

Early transportation in Florida depended almost entirely on streams and the coastal waters. The St. Johns River was the main channel of commerce for a major portion of the territory and it continues to hold its important role as a navigable stream. Steamboat traffic on the river reached its peak in the 1870's and 1880's. Large luxurious side-wheelers were built

to accommodate the tourists who already were beginning to visit the State. By 1885 the registry of St. Johns River traffic listed a total of 74 vessels aggregating 8,168 tons. These boats ran between Jacksonville and all points on the river carrying passengers, mail and cargo.

Intensive development of the basin and Florida did not begin until 1880. Jacksonville with approximately 17,000 people was the second largest city in the State. It was an important shipping center exporting lumber and naval stores produced in the basin. Railroad developments were initiated at this time which aided tremendously in the opening up of the area. Further stimulus was given to the development of the basin by the Florida land boom of 1920 to 1925.

PHYSICAL DESCRIPTION

The St. Johns River Basin comprises an area of 7,612 square miles entirely within the State of Florida. The basin is bounded on the north and northwest by the St. Marys-Nassau River Basin, on the east by the Atlantic Ocean and the Florida East Coastal Area, on the south by the Kissimmee River Basin, and on the west by the Suwannee and Withlacoochee River Basins.

The St. Johns, Florida's most important river, arises in the great grassy plain about 25 miles inland from the Florida east coast and some 50 miles north of Lake Okeechobee. It flows north through a series of lakes for 257 miles to Jacksonville, thence east 26 miles to the Atlantic Ocean. (See General Reference Map No. 1)

An outstanding feature of this river is its low gradient. Tidal effect is felt to and above Palatka 81 miles above its mouth. This stretch of the river consists of a long lagoon from one fourth to three miles wide. The 90 miles of river from Palatka up stream to Sanford consists of a series of lakes connected by a wide, sluggish channel. During extreme low river stages Lake Harney, 190 miles above the mouth, is approximately

at mean sea level; and during extreme high tides the water has been known to flow upstream into this lake. Lake Helen Blazes, 283 miles above the mouth, during low stages, is only about 11 feet above mean sea level

These characteristics of the St. Johns River, i.e., tidal effect, slow current, shallow depth, and the relatively broad basin for most of its length, give it an older appearance than its geological record indicates.* The valley of the river which dates from the Pleistocene period, was formed in part from wave built sand bars and its basin was formed from lagoons, streams, and solution lakes.

Much of the land bordering the St. Johns is swampy and flooded during high river stages. This flooding occurs especially in the summer months when precipitation is greatest and gradually subsides during the fall.

The largest tributary stream is the Oklawaha River, one of the most beautiful of Florida's streams,

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* Pierce, E. Lowe--An annual cycle of the plankton and chemistry of four aquatic habitats in northern Florida. U. Fla. Press, 1947 as credited to C. Wythe Cooke in "Scenery of Florida Interpreted By A Geologist". Fla. Geol. Surv. Bull. 17: 5-118,1939.

which arises in the lake country of central Florida near Eustis and flows generally north to Marion County, entering the St. Johns River in the vicinity of Welaka. The current in the Oklawaha is somewhat swifter than that of the St. Johns and its channel is relatively deep. Great tracts along the river are swampy and subject to overflow during the rainy season.

The St. Johns River Basin lies in the physiographic province known as the Coastal Plain. This province may be sub-divided in this basin into two regions; i.e., the Coastal Lowlands where the ground elevation is less than 100 feet above sea level, and the Central Highlands which occupy the major portion of the basin. The western edge of the basin is marked by a ridge, nowhere more than 300 feet above sea level, which forms the watershed divide between drainage to the Atlantic coast and that flowing toward the Gulf of Mexico.

Typical of the region are a succession of hills and hollows interspersed with broad low plains. In the southern part near the headwaters of the St. Johns River, there are vast expanses of grassy plains. The Central Highlands Region is remarkable for thousands of lakes

due largely to sink holes or depressions resulting from the solution of the limestone which underlies much of the region. Many of these lakes are crystal clear and most are shallow. Lake systems are usually the sources of the streams. The water area of the basin is approximately 900 square miles, about 12 percent of the total area.

A peculiar feature of the drainage is the large number of subterranean streams and springs. The springs often emerge into lakes. One of these, Silver Springs, has an average discharge rate of 816 cubic feet per second and a maximum flow of 1,240 cubic feet per second. It is believed to have the greatest discharge of any group of limestone springs in the United States.

Chief factors controlling the climate of the basin are latitude, elevation above sea level, and proximity to the Atlantic Ocean and the Gulf of Mexico. The mean annual rainfall varies from about 48 inches in the north to 55 inches in the extreme southern part of the basin. Heaviest rainfall occurs during the summer months. The mean temperature varies from

69 degrees in the north to 72 degrees in the south. The average January temperature in the vicinity of Jacksonville is 56 degrees, and in the south 64 degrees. The average July temperature for the entire basin is approximately 82 degrees. The frost free growing season is long, averaging 299 days at Jacksonville, and from 310 to 365 days in the southern half of the basin. West Indian hurricanes which usually threaten during the early fall months occasionally do serious damage.

At DeLand, which is normally above tidal effect on the St. Johns River, a 13-year record of the U.S. Geological Survey gage shows an average discharge of 2,904 cubic feet per second, a maximum discharge of 14,400 cubic feet per second and a minimum discharge of 10 cubic feet per second. The watershed area at this point is about 3,000 square miles.

The 17 year average discharge at the U.S. Geological Survey gage near Orange Springs on the Oklawaha River, where the approximate watershed area is 1,191 square miles, is 1,611 cubic feet per second. The maximum recorded discharge was 9,760 cubic feet per second and the minimum was 741 cubic feet per second.

ECONOMIC DEVELOPMENT

The total population of the basin in 1940 was 418,482 (Table 3). The preliminary 1950 census indicates a basin population of 580,710 representing an increase of 28 percent.

The basin contains 14 urban communities which comprise 61 percent of the total population. The largest of these is Jacksonville having an estimated population of 200,000. Other major urban centers include Orlando (51,826), Gainesville (26,577), Sanford (11,742), and Ocala (11,588). The remaining nine urban communities are DeLand, Eustis, Green Cove Springs, Jacksonville Beach, Leesburg, Mt. Dora, Palatka, Winter Garden, and Winter Park which have a combined population of 53,368. The influx of tourists during the winter months results in an increase of population. The winter population at Orlando in 1940 was 30 percent greater than the summer population. Winter populations at Jacksonville Beach and Neptune Beach were three times the summer populations that year.

The average density of population for the basin was 55.0 per square mile in 1940. Table 3 in the

appendix shows the density of population by counties, with variations from 5.2 persons per square mile in the grassy plains of Osceola County to 302.9 in Duval County which includes the city of Jacksonville.

The 1940 labor force was reported as 159,603 persons with 142,515 listed as industrial workers (Table 4), and 17,088 listed as agricultural workers (Table 5).

The basic wealth of the St. Johns River Basin lies in the land and in industries based upon agriculture. The value of farm production in 1945 has been estimated at nearly 53 million dollars (Table 5). The most valuable single farm product is citrus fruit (29 million dollars in 1945) which is produced primarily in Lake, Orange, Indian River, Marion, Osceola, Volusia, and Brevard Counties in the southern and central portion of the basin. In 1945 Orange and Lake Counties ranked second and third respectively in the State in the value of citrus fruits produced. In 1950 producing citrus groves in this area were selling from $2,000 to $2,500 an acre and were still increasing in value.* New

* Industrial progress in Florida, 1950. Dept. Agric., Tallahassee, Florida, 1950.

and undeveloped citrus land was up six times the price of 1949 and could only be found in tracts of 80 to 100 acres, while the demand was for thousands of acres. This citrus land boom was based on the recent discovery of new ways of processing citrus juice (frozen concentrated juice), increased canning, and an increased demand for fresh fruit throughout the nation. In 1940 approximately 300,000 acres of land in the basin were being drained for agricultural purposes.

Industry is expanding rapidly within the basin. (Table 4). In 1939 there were an estimated 508 manufacturing industries. In 1948 this number had increased to a total of 811 with 307 in Duval County (Jacksonville), 168 in Orange County, and Lake County had 106 manufacturing industries. This represents a total basin-wide increase in manufacturing industries of 60 percent over 1939; and represents increases of 23 percent in Duval County, 140 percent in Orange County, and 253 percent in Lake County. Food and kindred products, which constituted 43 percent of all manufacturing industries, represented the most important single type of manufacturing industry in the basin in 1948.

The fastest growing industry in the St. Johns River Basin (and in Florida) in 1948, 1949 and 1950 was the canning industry, the greatest portion of which is devoted to canning citrus products. This growth is, in large part, due to the phenomenal success of frozen citrus concentrate which was first marketed in 1946, and of which nearly 25 million gallons was produced in Florida in 1949.* Within the St. Johns River Basin the citrus canning industry is concentrated in Lake and Orange Counties and in neighboring counties within the citrus belt.

Other important industries are based on the raw materials supplied by extensive forests which are estimated to occupy 74 percent of the total area of the basin.** The St. Johns River and the deep water port at Jacksonville tend to concentrate these and other industries in the northern part of the basin. Paper mills are located near Palatka and at Jacksonville and

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* Science stabilizes economy in the land of sunshine. The Laboratory Vol. 20, No. 1, pp 3-6, 1950

** Forest statistics for Florida, 1949. Forest Services Release No. 36, Oct. 1949 USDA. This figure includes forest land considered elsewhere, in part, as farm land.

it is planned to build a third mill at Eastport.* Large naval stores extraction plants which utilizes pine stumps are located at Gainesville and at Jacksonville. Eighty industries utilize forest produce in manufacturing products of lumber or wood, and 37 others manufacture furniture or fixtures.

The great grassy plains at the headwaters of the St. Johns River are particularly noted for beef cattle production. This is part of a vast grazing area which has enabled Florida to rank 13th among the States in cattle production. The growth of this phase of agriculture has been rapid in recent years due, in part, to supplemental feeding of citrus canning wastes which have been processed as stock feeds.

The principal agricultural products of the basin, other than citrus fruits and beef cattle, are truck crops, potatoes, watermelons, corn, peanuts, hogs, and poultry.

The tourist trade is still Florida's number one industry. It has been estimated that in the 1947-48 season over 830 million dollars of the State's income

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* Industrial progress in Florida 1950. Dept. Agric., Tallahassee, Florida.

came from this source. During that season over four and one-half million tourists visited the State. The St. Johns River Basin, which is traversed by four main north-south arterial highways and a network of interconnecting paved and surfaced roads, four trunk-line railroads, and four major airlines, receives its share of this vast trade.

Water borne commerce also is of major importance in the economy of the basin. Jacksonville, located on the St. Johns River 25 miles from the Atlantic Ocean, is second only to Tampa among the port cities of Florida and is first in imports. In 1946 Jacksonville ranked 40th among the chief port cities of the United States and handled 2,540,271 tons of cargo.*

For the six years 1941-46, average annual commerce on the St. Johns River up river from Palatka was 226,823 tons of boat and barge traffic and 206,095 tons of rafted logs--an increase in total tonnage of 259 percent over the average of the preceding six years. The barge and boat traffic consisted largely of petroleum products (61 percent), foodstuffs (18 percent), forest products

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* World Almanac

(6 percent), and miscellaneous shipments, including general merchandise, (15 percent).* The trend has been generally upward. Since 1944, however, outbound raft movement largely of cypress logs have been discontinued because of exhaustion of the source of supply.

The average annual post war freight traffic on the St. Johns River up stream from Palatka in 1946 was predicted to be as follows:*

	Tons
Petroleum products	200,000
Fertilizer & materials	40,000
Fruit & vegetables, (fresh & canned)	312,000
Forest products	20,000
Consumer goods & Misc. shipments	69,500
Total	641,500

Some mining is done in the basin. Lime, diatomite, peat, rutile, ilmenite, and zircon are mined near Ocala. Ilmenite is mined also near Jacksonville.

* St. Johns River, Florida, Jacksonville to Lake Harney H.D. 208, 79th Congress (Senate), 1946. (U.S. Engineers Report)

USES OF WATER RESOURCES

The water resources are used primarily for domestic and industrial water supply, navigation, fishing, recreation, livestock watering, irrigation, propagation and overwintering of waterfowl, and the maintaining of ground water levels throughout the area. The principal water uses for each section of the basin are shown on Map No. 2.

Ground water is plentiful throughout the basin. In the sandy soil sections of the upper part of the basin the water table is kept near the surface by ground water level control and irrigation. In these sandy soils rains percolate rapidly into the ground and flow to the natural drainage courses, as this soil has little ability for retention of the water. Structures controlling the flow of the underground water are in operation on a number of lakes and streams, particularly in Lake County at the head and along the Oklawaha River. There has been some decline in the ground water table in the vicinity of Jacksonville, due largely to increased pumping in that rapidly expanding industrial area, but the situation is not critical.

There are 86 public water supplies in the basin serving 470,778 people. Eighty-three of these public supplies depend entirely upon ground water sources. One supply, that of Orlando which serves a population of 85,000 people, obtains part of its supply from wells, but the majority of the supply comes from eight nearby lakes. The other two supplies, the one in Palatka serving 7,500 people and the one at Bellview which serves 630, are derived entirely from surface water sources.

The maintenance of ground water levels in the agricultural area is of major importance. Control structures prevent the draining away of water which has seeped into the sandy soil and provide additional water for irrigation. These measures are necessary to prevent loss of crops and pastures during drought periods. Irrigation of the land is practiced extensively in the area. The number of acres under irrigation for the years 1939 and 1940 is shown by counties in Table 7 of the appendix. Approximately 946 farms were irrigating about 25,000 acres in 1939. The area under irrigation has been increased since that time.

There is an overall water control and utilization plan for the upper portion of the St. Johns Basin.* This plan includes the drainage of certain areas, the development of additional irrigation projects, replenishing of municipal water supplies and water conservation. It envisions the construction of a multiplicity of canals, the improvement of existing canals and the addition of new water control structures. The canal and channel improvements will reduce floods and will provide for more rapid drainage of the flood water. The water control structures are designed to pass the flood waters but to retain sufficient water to maintain the water table and provide storage in the lakes which can be released to the channels during dry seasons.

Specifically, canals are planned to connect Lakes Wilmington and Poinsett to Indian River to draw off water from the headwaters of the St. Johns River. Water control structures are planned for Lakes Mary Jane and Preston at the headwaters of the Econlockhatchee River. A canal is planned to divert the water

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* Robinson, B.L. - The plan for water control and utilization, central and southern Florida. Unpublished lecture presented by Col. Robinson, Div. Engr. South Atlantic Div., Corps of Engineers, Feb. 16, 1951.

from the headwater streams of the St. Johns River to the Kissimmee River Basin. The construction of a canal which would connect Lake Harney or Puzzle Lake and run to the Indian River in the vicinity of Titusville is also under consideration.* This canal would be constructed primarily for navigation, but would have secondary flood control benefits.

It has been pointed out by the Florida Game and Fresh Water Fish Commission that the completion of these proposed projects would seriously reduce the value of this area at the headwaters of the St. Johns River to migratory waterfowl. At present the area provides extensive overwintering habitat for migratory waterfowl and therefore is of national importance.**

Navigation and commerce on the St. Johns River is one of the important water uses. A channel 30 feet deep and generally from 300 to 600 feet wide is maintained along the 28 mile course of the river from the Atlantic Ocean to Jacksonville. Channel dimensions of

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* Preliminary report to Corps of Engineers, U.S. Dept. of Army, Jacksonville, Fla. from Regional Director Fish and Wildlife Service, Atlanta, Ga., Feb. 17, 1950.

** Chamberlain, E.B. Jr. - Annual report Florida Waterfowl Survey, July 1, 1949 - June 30, 1950. Unpublished.

13 feet deep and 200 feet wide are maintained from Jacksonville to Palatka (55 miles); 12 feet deep and 100 feet wide from Palatka to Sanford and in the side channel from Sanford to Enterprise (90 miles); and five feet deep and 100 feet wide from Sanford to Lake Harney (25 miles). In addition, an eight foot channel has been provided for 15 miles from the mouth of Dunn's Creek to Crescent City.* There is also some navigation on Rice Creek.

The Oklawaha River has been improved to provide a six foot channel depth from its mouth to the head of Silver Springs Run (58 miles), and a four foot depth thence to Leesburg 86.5 miles above the junction with the St. Johns.*

In 1942 Congress authorized construction of a high-level lock and barge canal 12 feet deep and 150 feet wide across northern Florida as a connecting link of the Gulf and Atlantic sections of the Intracoastal Waterway. It would utilize the 89 mile stretch of the St. Johns River to Stokes Landing above Palatka, thence

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* St. Johns River, Florida, Jacksonville to Lake Harney, Document 208, 79th Congress (Senate). 1946. Prepared by Corps of Engineers, U.S. Army.

generally to and up the valley of the Oklawaha River to a point above Silver Springs Run, thence across the divide to the Withlacoochee River, thence to the Gulf of Mexico. It was estimated in 1935 that this canal would shorten the voyage from New York to New Orleans by two days, would provide a safer route, and would save annually $7,500,000 in transportation costs.

The annual water borne freight traffic on the Palatka to Lake Harney section of the St. Johns River during the 18 year period 1924 through 1941 averaged 237,185 tons. The traffic below Palatka is equally important. The trend on this upper section has been generally upward with the largest general increase occuring during the nine prewar years. During the five years 1937 through 1941 the largest outbound traffic consisted of rafted logs and inbound traffic was principally petroleum products. In 1944 the Wilson Cypress Company discontinued operations so that outbound raft movements largely were discontinued after that year. An average of 17,523 tons of pulpwood was barged down the river annually in 1943-45. It has been estimated that the average annual postwar freight traffic

above Palatka would amount to approximately 641,500 tons.

Water borne commerce at the port of Jacksonville in 1948 amounted to 2,411,000 tons of cargo. This was composed of 397,000 tons of imports, 79,000 tons of exports, 1,917,000 tons of coastwise cargo received and 18,000 tons of coastwise cargo shipped.

Commercial fishing is permitted on the St. Johns River northward from Volusia Bar which is located just south of Lake George.* By far the majority of the fresh water commercial fishing activity is concentrated in Lake George, an area of 73.5 square miles, but Crescent Lake and elsewhere on the St. Johns River also contribute to the commercial fishery of the area. The catch is composed largely of fresh water fishes, although characteristically marine species are caught in varied numbers. Data concerning the size and value of this catch is presented in Table 8. The total usable catch in 1945 was over seven million pounds and was valued at

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* Nelson, Marshall - Preliminary investigations on the effects of commercial fishing on game fish in Lake Okeechobee and the St. Johns River. Univ. Miami Marine Laboratory, Coral Gables, Florida, July 1946. Unpublished report.

nearly one and a half million dollars. The food fish catch from Putnam County alone was over three million pounds in 1948, and that from Duval County (including fish from the sea) was over two million pounds.*

Catfishes constitute nearly half of the commercially valuable catch from the St. Johns annually, with blue crabs, sunfishes, shad, herring and crappies ranking high. In addition, several million pounds of trash fish are taken annually. The trash fish catch indicated in Table 8 (gar, hickory shad, etc.) represent only a very small proportion of the total trash fish taken because they enter these records only when marketed for bait or other purposes. Although largemouth black bass are taken, it is illegal to retain this species for sale.

The mouth of the river is important as a commercial shrimping ground. A quick-freeze plant was under construction in Mayport in 1950 which was expected to process approximately 48,000 pounds of seafood in

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* The commercial fishing industry in Florida. Bull. Fla. State Board of Conservation. Date of publication not indicated.

24 hours.* Trash fish will be processed for use as dog and cat food.

In non-food fish production, which is largely from marine waters, Duval County ranked second in the State in 1948 with a take of 43,121,676 pounds.** Menhaden, which are processed into oil, fertilizer and feeds, are an important element in this total.

Duval County in 1948 also ranked second in Florida in shellfish production with 17,901 pounds, and first in the production of crabs, crayfish, shrimp and other miscellaneous seafoods with a total of 7,019,729 pounds.**

The water resources of the basin (approximately 900 square miles of water surface) appear to be only partially developed in regard to recreational possibilities. This fact may be due to the competing attraction of the nearby seaside areas which lie, for the most part, in other basins. Exceptions, however, are the

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* Industrial progress in Florida 1950. Dept. Agriculture, Tallahassee, Florida.

** The commercial fishing industry in Florida. Bull. Fla. Board of Conservation. Date of publication not given.

important resorts at Jacksonville Beach, Atlantic Beach, and Neptune Beach which possess fine beaches and offer many recreational outlets for the residents of metropolitan Jacksonville and also for tourists.

Utilization of the extensive fresh water sports fishery of the basin is becoming increasingly important as a water use. Resort areas or fishing camps have been established on many of the multitude of lakes and streams which abound in the basin. In 1950, for example, there were 202 boats for hire from 27 camps located on Lake George and the St. Johns River in Marion and Putnam Counties. These numbers represent an increase since 1946 of 449 percent in the number of boats available for the use of sports fishermen and an increase in the number of fishing camps of nearly 400 percent. Outstanding catches of largemouth bass from this area are reported regularly by columnists and sportcasters from as far away as Atlanta, Georgia. One of the major national airlines sponsors the "Flying Fisherman Club" which is stimulated, in part, by the fine fishing offered by the St. Johns River Basin.

During the 1949-50 season a total of 67,635

resident and 27,279 non-resident fishing licenses were sold in the counties located entirely or partly within the St. Johns River Basin (Table 9). In addition a substantial part of the potential fishing population was not required by law to purchase licenses in that year.

It is estimated by the Florida Game and Fresh Water Fish Commission that the potential production of largemouth bass which could be safely harvested annually from Lake George is at least 300,000 to 400,000 pounds.* The largemouth bass is by far the most important fresh water game fish to be found in this basin.

Lakes furnish ideal park sites for cities, such as Orlando, fortunate enough to have one or more lakes within their corporate limits. Many of the lakes are crystal clear and most are relatively shallow, thus providing ample opportunity for swimming, fishing, boating and other aquatic sports.

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* Dequine, John F. - Fisheries investigations of the St. Johns River and Lake Okeechobee, 1948-50 with recommendations for management. Report to Director and Members of Fla. Game and Fresh Water Fish Commission, Revised report, April 3, 1951.

One of the best known fresh water resorts in the nation is Silver Springs which is located six miles east of Ocala. These springs, which have a maximum recorded discharge of 1,240 cubic feet per second, are believed to be the largest of any group of limestone springs in the United States. The largest of Silver Springs is really a subterranean river emerging through a submerged cavern 65 feet wide and 12 feet high 50 feet below the surface of the lake. The water is noted for its clarity permitting such recreational activities as swimming, underwater ballet and photography, or merely the enjoyment of the underwater beauty through glass-bottomed excursion launches which travel on the nine mile stretch of Silver Springs Run through semi-tropical jungle. Over 700,000 visitors a year stop at these springs.

A sulphuretted spring said to have curative powers is located at Green Cove Springs in Clay County. This spring has a discharge of about 3,000 gallons per minute. Other large springs around which resorts have been established are Ponce de Leon Springs in Volusia County, and Sanlando Springs in Seminole County.

Hunting is a major sports activity in the basin both for upland game and migratory waterfowl. During the 1949-50 season a total of 30,668 resident and 332 non-resident hunting licenses were sold in the counties entirely or partly within the St. Johns River Basin (Table 9). The lake region and the upper St. Johns River provide outstandingly good waterfowl hunting. Although hunter success data for the St. Johns Basin alone are not available, those obtained by the interviewing of 590 Florida hunters during the 1949-50 season, may be applicable.* The average daily bag per hunter was 2.65 ducks, 2.14 coots, and 0.07 geese. The "average" gunner hunted 6.3 times during the season. The average seasonal bag of ducks consisted of 27.8 percent ring-necked ducks, 15.7 percent pintails, 11.7 percent scaup, and the remaining 44.8 percent was composed of 14 other species of ducks.

The fish and wildlife resources of the basin are extensive. The myriad lakes, ponds, marshed and rivers of the basin provide an alluring path of migration

* Chamberlain, E.B. Jr., - Quarterly report for January, February and March, 1950, Florida Waterfowl Survey, Florida Game and Fresh Water Fish Commission. Unpublished report.

for many birds and an ideal habitat at all seasons for countless numbers of waterfowl, shore birds, and swamp-loving species. Although no figures are available specifically for the St. Johns River Basin, more than half of the 800 species of birds classified in North America have been observed in Florida. As many as 50,000 white ibis have been estimated to have made Lake Washington near the headwaters of the St. Johns their home during the nesting season. Floating islets on Lake Orange near Gainesville, where a white ibis rookery exists, are owned and guarded by the Florida Audubon Society.

Ocala National Forest, comprising 441,925 acres, lies between Ocala and the St. Johns River. It contains the largest existing area of sand pine in the world. This forest is highly valued by sports enthusiasts as a hunting area for deer and wild turkeys.

One of the most valuable areas of the basin, from the standpoint of migratory waterfowl both nationally and locally, is the upper St. Johns River valley above Lake Harney. It is estimated that over a six month period during the fall and winter of 1950-51, an

average of 32,000 of our rapidly dwindling number of migratory waterfowl utilized the area.* The present high waterfowl utilization of this valley depends upon fluctuation water levels which inundate feeding grounds for four or five months each year. A threat to this waterfowl habitat, in the opinion of the Florida Game and Fresh Water Fish Commission, is posed by a current flood control program which is under consideration by the Corps of Engineers, U.S. Department of Army. These works would hasten rur-off and drastically reduce the amount of time the feeding marshes would remain inundated, thus destroying a major part of the waterfowl feeding area in the upper valley of the St. Johns.**

No hydro-electric developments exist in the basin since the nature of the terrain is not suitable for such construction.

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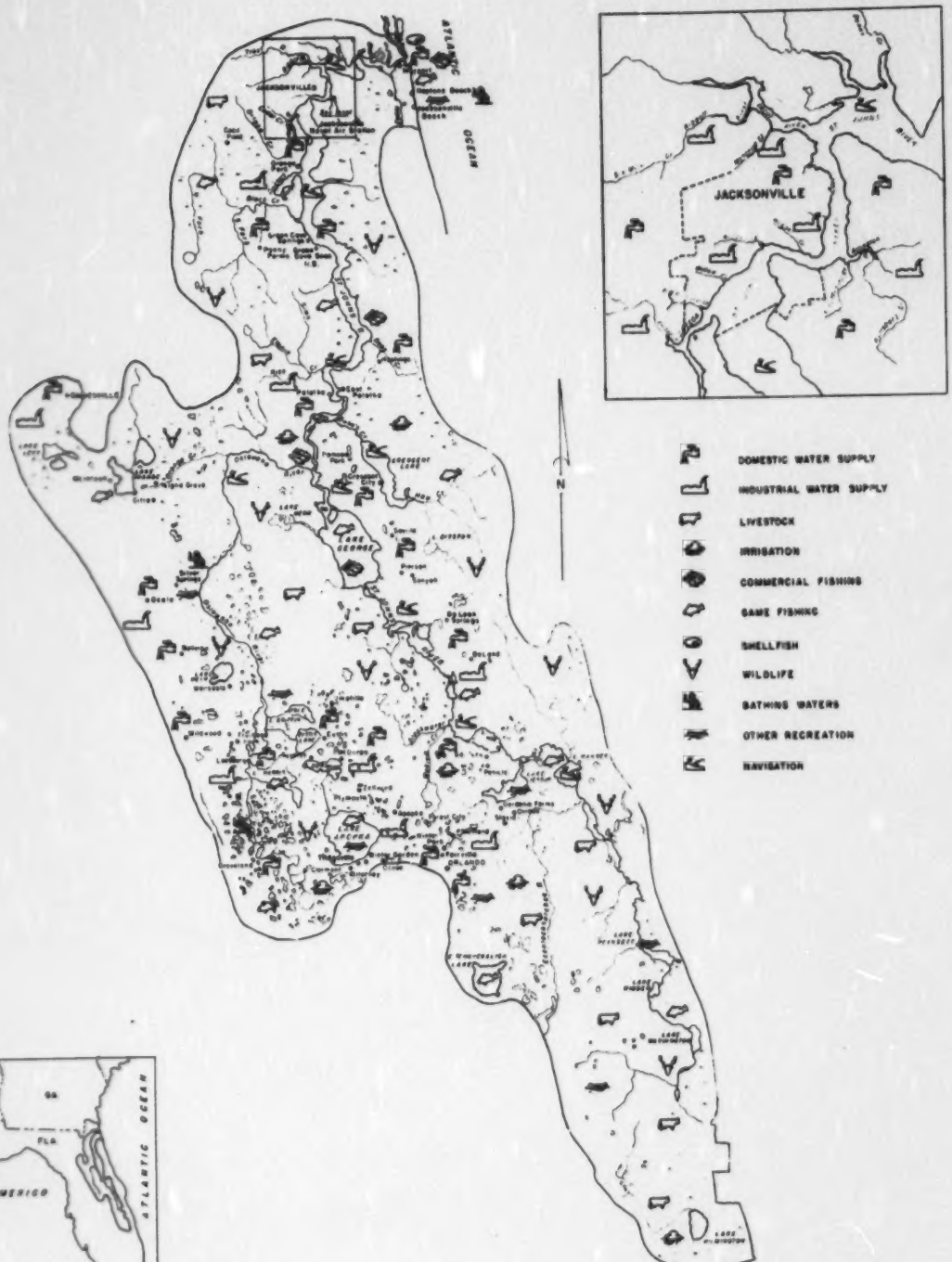
* Chamberlain, E.B. Jr. - Annual report Florida Waterfowl Survey, January-March 1951. Florida Game and Fresh Water Fish Commission. Unpublished report.

** Chamberlain, E.B. Jr. - Annual report Florida Waterfowl Survey, July 1, 1949-June 30, 1950. Florida Game and Fresh Water Fish Commission. Unpublished report.



ST. JOHNS RIVER BASIN
LOCATION MAP

SCALE OF MILES

10 0 10 20 30 40

ST. JOHNS RIVER BASIN

EXISTING PRIMARY WATER USES

FEDERAL SECURITY AGENCY

Public Health Service

DIVISION OF WATER POLLUTION CONTROL

MAP NO 2

POLLUTION CONTRIBUTED TO WATER RESOURCES

A general tabulation of basic data on sources of municipal pollution is found in Table 1, and similar data on sources of industrial pollution are presented in Table 2 of the appendix. The data concerning the municipal and industrial pollution contributed to water resources are summarized in Tables A and B, and their relative locations are shown on Maps 4 and 5.

There are 42 municipalities which contribute pollution to the water resources of the St. Johns Basin. Thirty-nine of these municipalities have a sewered population of 299,800. The remaining three are U.S. Naval establishments for which no population served data is available. Forty-one of these municipalities discharge pollution to the watercourses having a population equivalent of 273,100. The amount of pollution discharged to the watercourses by one naval establishment is not known. This population equivalent includes the sewage from 15 industries which discharge wastes to municipal collecting systems. In addition, these collecting systems receive waste of unknown population equivalent from more than 60 industries.

The town of Mayport, which has no municipal sewers, is contributing to the pollution of the stream through the discharges of individual septic tanks. The effluent of these septic tanks has an estimated population equivalent of 700.

A total of 123 industries in the basin discharges wastes directly to watercourses or to subsurface drainage. Twenty-seven of these discharge organic waste having a reported population equivalent of 279,800 or an amount equal to 93 percent of the known sewered population of the basin. In addition 93 produce organic wastes for which the amount of pollution discharged is undetermined; two produce inorganic wastes; and one produces wastes of undetermined type.

The food and kindred products industries (Table D) with 99 plants constitute the most numerous type of industry which discharges waste directly to watercourses. This is 80.5 percent of all major industrial sources. The 12 chemical industries, which constitute 9.8 percent of the total, are the second most numerous group. There are also two paper industries, one of which (Hudson Pulp and Paper Corporation) is a major pollutor. The St. Regis Paper Company is planning to construct a kraft process plant at Eastport which, if operated according to plan, should not contribute excessive

amounts of pollution to the St. Johns River.

The majority of the 99 industries producing food and kindred products are processors and/or packers of citrus fruits. These are located principally in the Orlando-Winter Garden area and in Lake County. Strong wastes are discharged into the lakes; but due to the holding time, there is apparently little effect other than that created by local nuisances and the consequent lowering of esthetic values. Examples of this type of activity are found at Plymouth, Winter Garden and Leesburg where citrus canning plants, concentrate plants, and cattle feed processing plants are located. Wastes from these types of plants constitutes the most serious industrial pollution problem with which the State is faced. The rapidly increasing number of citrus processing industries and the lack of knowledge of an economical method of treating their wastes, combined with a rapidly growing population, will result in increasing demands on the water resources of the area. A limited survey of the citrus processing industry in Florida is underway in 1951 by the Bureau of Sanitary Engineering of the Florida State Board of Health to

better evaluate the industry's problems of waste disposal. It is already indicated that research on methods of citrus waste disposal and by-product use are badly needed.

Domestic sewage, after various degrees of treatment, discharges into the St. Johns river from practically every center of population along its length. With the exception of bacterial pollution at such municipalities as Green Cove Springs, Palatka, and Sanford, these domestic wastes do little harm to the St. Johns River because of the large dilution factor. Other exceptions are found in the vicinity of Jacksonville where local nuisances exist.

At Jacksonville there is discharged the raw sewage from approximately 200,000 people as well as industrial wastes from the National Container Corporation paper mill, several pine products manufacturing plants, and a palmetto fiber processing plant (Table 2). This is in addition to the wastes from the usual number of laundries, meat packing plants, dairies and other industries. Several tributary streams flowing through and near the city such as Ortega River, McCoys Creek,

Moncrief Creek and Ribault River receive a large part of both the municipal and industrial wastes.

In many instances throughout the basin both domestic and industrial wastes and even drainage from roadside ditches, are disposed of by subsurface drainage into the porous limestone which underlies almost the entire region. This practice has resulted in the pollution of ground waters and, at times, in the formation of local pockets of methane gas. It has not been possible, in most cases, to trace the direction of flow or ultimate destination of waste materials which have been disposed of in this manner.

Pollution of the water resources of the basin by silt originating from soil erosion is not a problem due to the generally level gradient of the area and the sandy soil. Although silt is a waste product of the Humphrey Gold Corporation, which is located near Jacksonville, this silt is largely removed by lagooning and does not reach the Arlington River.

TABLE A

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In number of Municipalities)*	Population Served by Sewage System	Amount of Pollution Discharged to Watercourse(In Terms of Equivalent Number of People)**
Having data on pollution load discharged to watercourse	1/ 41	299,800	273,100
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	-	-
TOTAL	2/ 42	299,800	XXX XXX

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

** Includes industrial wastes discharged into municipal sewage systems.

1/ Includes two military establishments for which only the amount of pollution discharged to the watercourse was reported; and 13 small municipalities which have secondary treatmnet plants. The effluent from these treatment plants is of such quality that their discharges to the watercourses do not constitute significant sources of pollution. Does not include Mayport which has no municipal sewers, but requires a complete sewerage system.

2/ Total includes one military establishment for which neither population served nor amount of pollution discharged to watercourse was available.

TABLE B

SOURCES OF POLLUTION

INDUSTRIAL*

Industries*	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	27	279,800
Producing Organic Wastes	** 93	Undetermined
Producing Inorganic Wastes	2	Not Applicable
Producing Wastes of Undetermined Type	1	Undetermined
TOTAL	123	xxx xxx

* Industries having separate outlets discharging wastes directly to watercourse.

** Includes three industries which discharge part of their wastes to city sewers.

DAMAGES TO WATER RESOURCES FROM POLLUTION

The surface waters of the St. Johns River Basin are not extensively damaged by pollution. The large volumes of water available for dilution of the discharged wastes prevent extensive damage in the main watercourses. Furthermore, a large portion of both municipal and industrial wastes are discharged to underground caverns in the porous limestone strata. This undesirable disposal practice has polluted artesian well water supplies causing serious public health problems in some localities. The discharge of domestic and industrial wastes to surface waters does pollute limited reaches of the receiving watercourses.

Perhaps the most grossly polluted area in the basin is at heavily populated and highly industrialized Jacksonville where no treatment is provided to municipal sewage, and very few industries treat their wastes. A report by the Florida State Board of Health in 1948 indicates that there were few places on the St. Johns River between Green Cove Springs and the mouth of Trout River, a distance of about 33 miles, where sanitary conditions of the water would permit safe swimming.

Nuisance conditions occur from time to time in certain of the tributaries at Jacksonville and in certain of the shoreline waters of the main stream. These streams include Ortega River, McCoy's, Hogan's, Miller's, Deer, and Moncrief Creeks, Long Branch and Ribault River. Nuisance conditions develop, because of the settling of suspended solids, at some of Jacksonville's more than 70 municipal sewer outfalls part of which discharge along the shorelines in relatively shoal and quiescent water.

The entire St. Johns River to its mouth is condemned for shell fishing because of pollution. The closed area includes Mt. Pleasant Creek and a portion of Sister's Creek which are located a short distance up river from Mayport.

Another health hazzard prevalent at Jacksonville results from the flooding of the streets and yards in the low areas of the city and its environs. The normal spring and fall high tides and the torrential rains which usually accompany late summer hurricanes flood the sewers and private septic tanks causing the sewage to overflow the ground surface. The situation is

accentuated by the extremely flat grades of the existing sewers, insufficient sewers, and the absence of sewage treatment facilities.

Another badly polluted stretch of the river occurs near Palatka. The effluent from the Hudson Pulp and Paper Corporation, a sulfate pulp mill, has been reported to be grossly polluting two and a half miles of Little Rice and Rice Creeks from the point of discharge to the confluence of Rice Creek with the St. Johns River.* & ** Along the west bank of the St. Johns River north of the mouth of the creek, an area 2,500 yards long by 300 yards wide is intermittently affected. Fish have been killed in Rice Creek on frequent occasions and in significant numbers. It is reported that recently improved operation of the plant has reduced the amount of putrescible material discharged to the stream.

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* Rice Creek pollution survey (Hudson Pulp and Paper Corporation) May-June-July 1948. Florida State Board of Health, Bur. San. Engineering.

** Joint sanitary survey of the waters of the State of Florida receiving wastes from pulp and paper mills for the Florida Pulp and Paper Industry April 1, 1949-May 1, 1950. Joint report Florida State Bd. Health, Bur. San. Eng. and Nat. Council for Stream Improvement of the Pulp, Paper and Paper-Board Industries, Inc.

Lagoons currently being planned for construction by the company will, when completed, further reduce or eliminate the damage now being done.

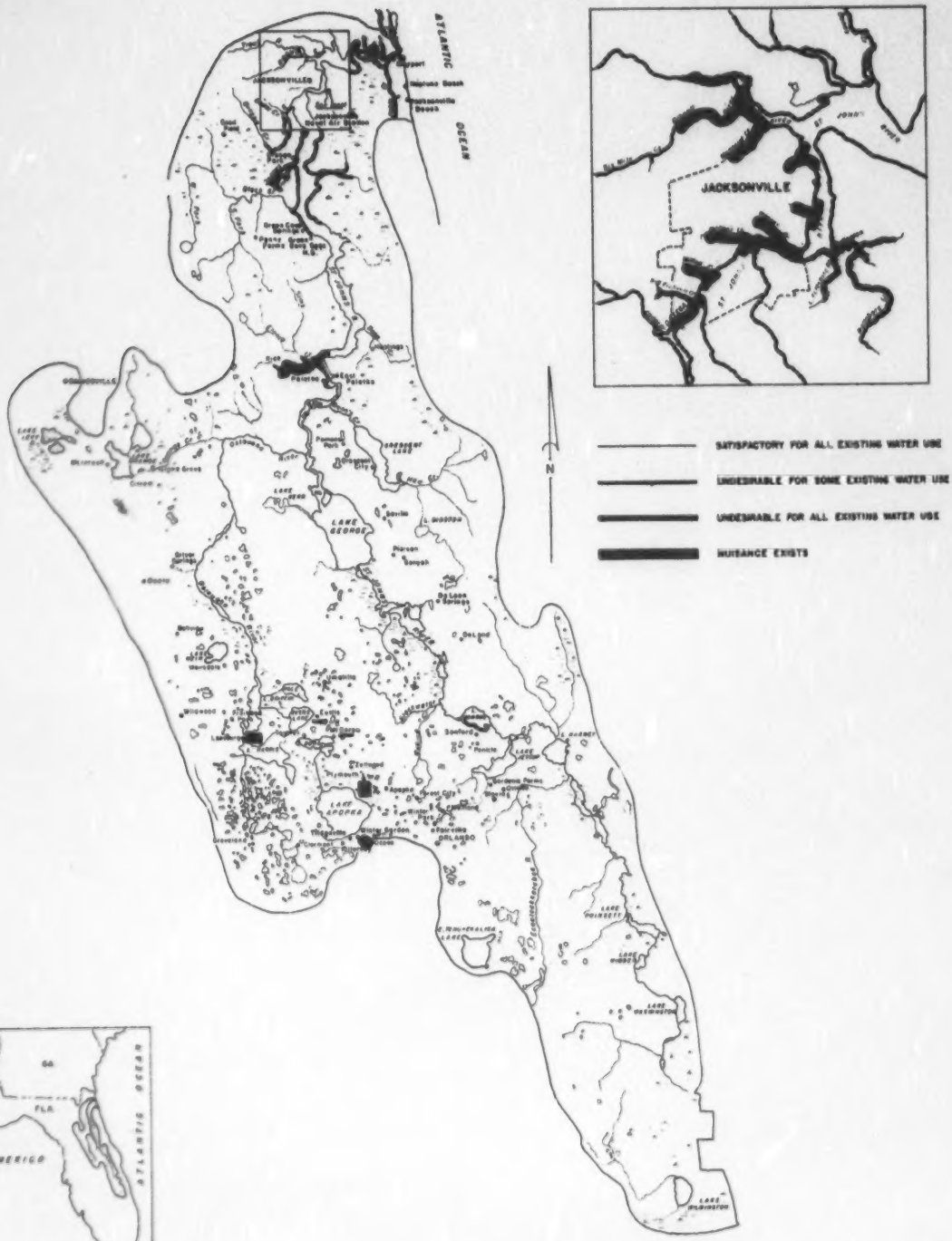
The common practice throughout the basin of discharging both municipal and industrial wastes to underground waters has resulted in a degradation of the quality of well waters in a number of places. Bacterial pollution of artesian ground water has been found in every water-bearing formation in general use in Orange County, although the situation has been rectified in large part by a new municipal sewage treatment plant at Orlando. The water as it comes from the generally polluted aquifers is unsafe for drinking purposes. This is especially true at Hawthorn in Alachua County, near Ocala and in the vicinity of Gainesville. The residents of the larger municipalities may not suffer from the polluted ground water because of the precautions taken to adequately purify the domestic water supply. It is the rural residents whose drinking water is most usually fouled. The smaller communities sometimes suffer also, as was the case in 1948 when poor operation of a chlorinator permitted

contaminated water to enter the distribution system at Ocoee. It is now becoming difficult for the health authorities to approve well water for use in outlying tourist camps, trailer parks and restaurants in areas where the pollution of the ground water supply is a problem. Pollution control in these areas has been limited almost entirely to domestic sewage. Surveys are underway to determine the extent of industrial waste pollution as preliminaries to corrective action where necessary.

Citrus canning, concentrating and/or processing plants constitute the most severe industrial waste problem within the basin because of the ever increasing number of plants and the lack of knowledge of an economical method of treatment of the wastes. The location of these industries is largely in Orange and Lake counties. Their waste discharge usually is to limestone caverns or to lakes where local nuisances are apt to occur. The economic losses due to local nuisances or the reduction of esthetic values is difficult to assess. The value of unpolluted waters can not be over-emphasized as they are one of the main attractions for tourists.

Occasionally instances may arise in which limited pollution may be considered beneficial. Such an instance apparently has occurred in Lake Apopka which has a width of approximately nine miles. It is reported by Dequine that a tenfold increase in total fish population, primarily game fishes, occurred in the lake during the two year period 1947-49.* The increase was due principally to a heavy algal bloom and large quantities of plankton which has persisted almost without interruption since 1947. He believes that the cause of this desirable condition may be, among other things, the fertilizing effect of accumulated deposits of organic discharges which reach the lake from citrus processing plants, and the decay of hyacinth and other aquatic vegetation destroyed in 1948.

* Dequine, John F. - Results of rough fish control operations in Lake Apopka during December 1949 and January 1950. Report to Director and Members of Florida Game and Fresh Water Fish Commission.



ST. JOHNS RIVER BASIN
LOCATION MAP

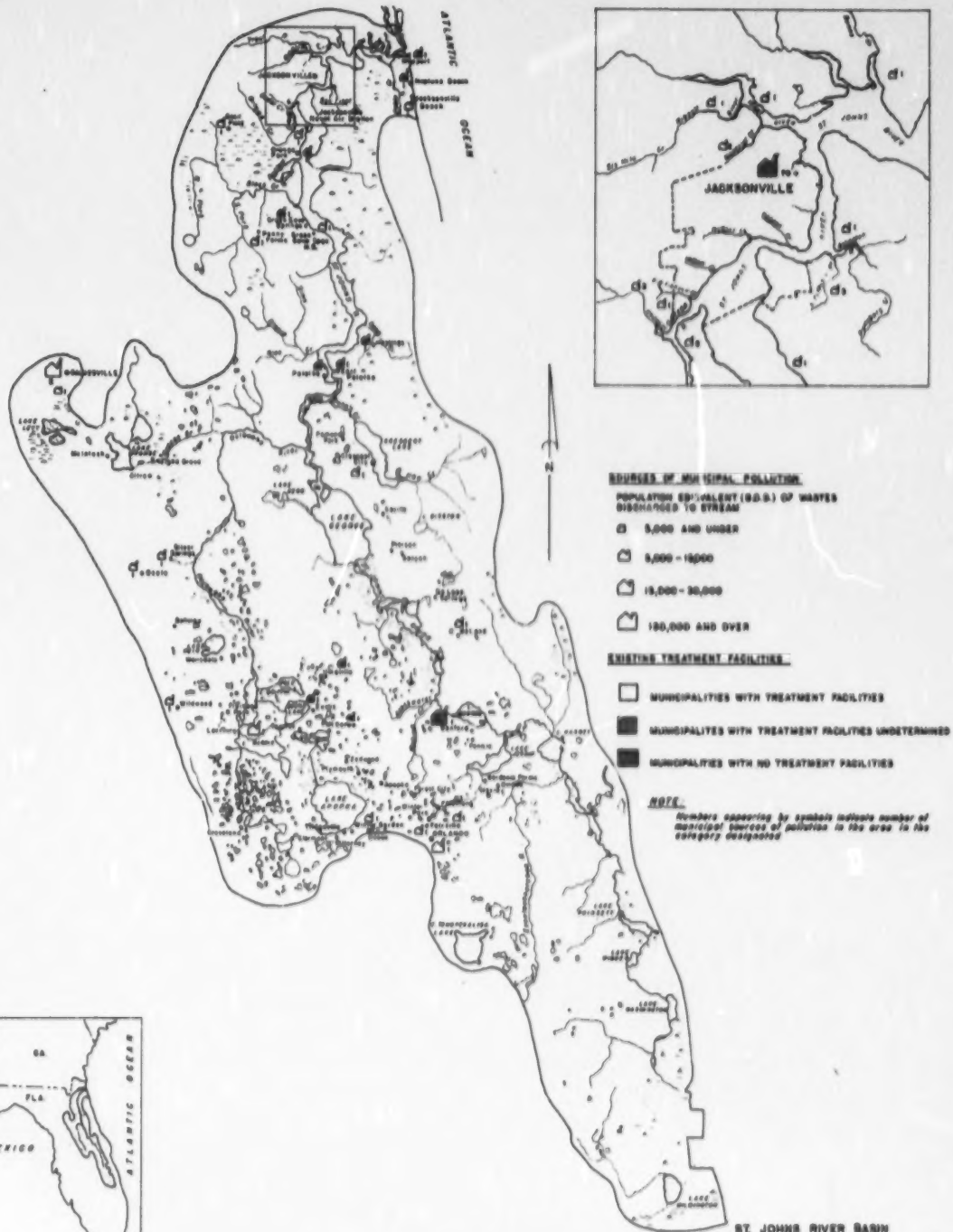
SCALE OF MILES

10 0 10 20 30 40

ST. JOHNS RIVER BASIN
PRESENT STREAM STATUS

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 3

FSA-ATLANTA, GA.


ATLANTIC OCEAN
JACKSONVILLE
N
SOURCES OF MUNICIPAL POLLUTION
POPULATION EQUIVALENT (B.O.D.) OF WASTES DISCHARGED TO STREAM
5,000 AND UNDER
5,000 - 15,000
15,000 - 30,000
100,000 AND OVER
EXISTING TREATMENT FACILITIES
MUNICIPALITIES WITH TREATMENT FACILITIES
MUNICIPALITIES WITH TREATMENT FACILITIES UNDETERMINED
MUNICIPALITIES WITH NO TREATMENT FACILITIES
NOTE
Numbers appearing by symbols indicate number of municipal sources of pollution in the area in the category designated

ST. JOHNS RIVER BASIN
LOCATION MAP

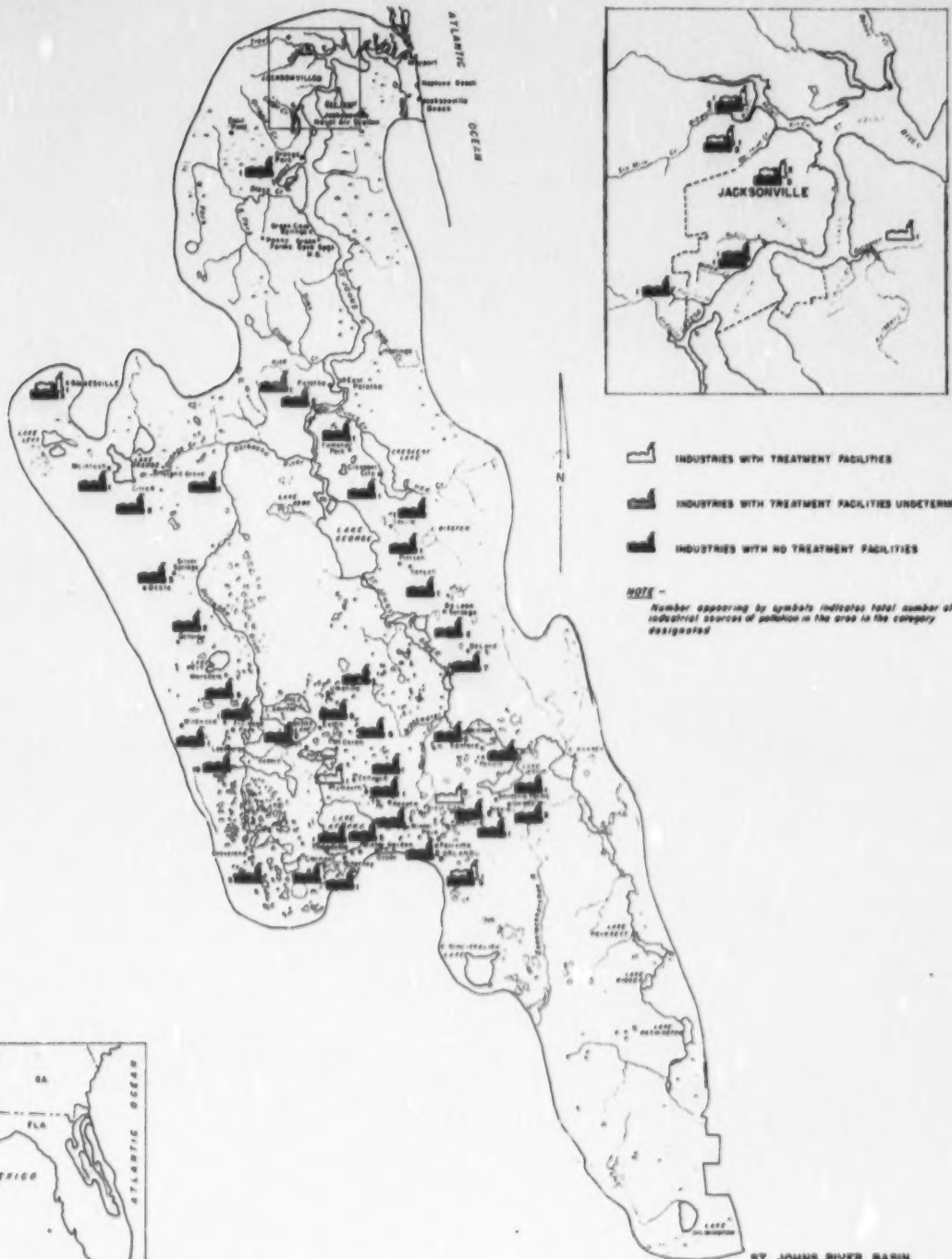
SCALE OF MILES
10 0 10 20 30 40

ST. JOHNS RIVER BASIN

SOURCES OF MUNICIPAL POLLUTION AND EXISTING TREATMENT FACILITIES

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 6

FSA-ATLANTA, GA.


ATLANTIC OCEAN
JACKSONVILLE
N
INDUSTRIES WITH TREATMENT FACILITIES
INDUSTRIES WITH TREATMENT FACILITIES UNDETERMINED
INDUSTRIES WITH NO TREATMENT FACILITIES
NOTE -
Number appearing by symbols indicates total number of industrial sources of pollution in the area in the category designated

ST. JOHNS RIVER BASIN
LOCATION MAP

SCALE OF MILES

0 10 20 30 40

ST. JOHNS RIVER BASIN

SOURCES OF INDUSTRIAL POLLUTION AND EXISTING TREATMENT FACILITIES

FEDERAL SECURITY AGENCY

Public Health Service

DIVISION OF WATER POLLUTION CONTROL

MAP NO. 5

FSA-ATLANTA, GA.

BENEFITS RESULTING FROM POLLUTION PREVENTION AND ABATEMENT

Benefits resulting from pollution abatement are expected to occur at Orlando, where it has been the practice in the past to discharge both municipal and industrial waste to disposal wells.

The methane or "sewer gas" produced by the decomposition of these wastes has built up a gas pressure in the water-bearing formation. A number of water supply wells in and around Orlando have been producing gas for at least twelve years. The quantity of gas produced has been sufficient to force abandonment of a number of expensive wells causing appreciable financial loss. Flash explosions of the methane have occurred on at least four occasions in Orlando, resulting in several cases of severe burns. One instance attracted considerable attention as the water supply well burned vigororously for several days.*

Less spectacular but more important from a public health standpoint, the practice of waste disposal beneath

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* The pollution of artesian ground waters by artifical recharge through drainage wells. Interim report of investigations 1948 by Bureau Sanitary Engineering, Florida State Board of Health.

the ground has resulted in the bacterial pollution of numerous well water supplies in the vicinity of Orlando. To prevent pollution of ground water supplies it is the policy of the Florida State Board of Health to prohibit the use of drainage wells as a means of disposal of untreated municipal and industrial wastes.

The City of Orlando has recently completed and placed in operation a new waste treatment plant. This plant will provide proper treatment to both municipal and industrial wastes of the city. Further pollution of the aquifers will be prevented. The preventing of further waste discharges to the water-bearing formations will result in a marked improvement in the quality of the ground water which is, in part, the source of the domestic water supply.

The production of by-products from citrus wastes has resulted in benefits both from the reduction of the wastes reaching the streams and the economic value of the by-product. Citrus pulp has been used for cattle feed but because of its off-flavor, it has not been too popular. By processing the pulp, however, a very satisfactory supplementary feed has been

obtained which is important in the development of the beef cattle industry of the basin. The natural grasses have not proved sufficiently nutritious to support a large beef cattle industry without supplemental feeding.

The citrus wastes also have been used in the production of industrial alcohol and citrus molasses. The cost of manufacture is high and these items can be produced economically only when the market is favorable. Further research into the possibility of extraction of these and other by-products from citrus wastes is desirable.

POLLUTION PREVENTION MEASURES IN EFFECT

The summary in Table C shows that ten of the 43 sewered communities (23 percent) have 11 primary treatment plants with a combined population served of 35,400. Twenty-one municipalities (49 percent) have secondary treatment plants serving a population greater than 71,100. The populations of two naval establishments having secondary treatment plants and one naval establishment having primary treatment are not available. Twelve municipalities (28 percent) serving 194,000 people provide no treatment. One of these latter cities is Jacksonville which has a sewered population of 170,000. Approximately 35 percent of the municipal sewage (based on population served) receives treatment (11.8 percent primary and 23.6 percent secondary) before discharge to the watercourses.

The reported existing industries which discharge wastes directly to watercourses or to underground drainage are classified by type in Table D. Eleven (9 percent) of these 123 industries provide some treatment for their wastes. One hundred eleven (90 percent) are

reported as having no waste treatment facilities. The status of waste treatment of one is undetermined. Ninety-nine (80.5 percent) of the 123 industries produce food and kindred products, 12 (9.8 percent) produce chemicals and allied products, seven (5.7 percent) are classified as miscellaneous, two (1.6 percent) produce paper and allied products, and one each produce lumber and wood products, products of petroleum and coal, and one is a mining industry.

A summary of the adequacy of existing municipal treatment facilities is given in Table E. Out of a total of 33 municipal treatment plants the adequacy with relation to capacity of 26 (79 percent) is satisfactory, 6 (18 percent) are classed as unsatisfactory, and that of one (3 percent) is undetermined. The adequacy with relation to operation of 29 (88 percent) is satisfactory, that of three (9 percent) is unsatisfactory, and that of one (3 percent) is undetermined.

The adequacy of existing industrial treatment facilities is summarized in Table F. The adequqcy with relation to both capacity and operation is satisfactory at three (30 percent) of the 10 industrial waste

treatment facilities, unsatisfactory at three, and undetermined at four (40 percent).

Progress in the construction of pollution abatement facilities during the period 1946 through 1950 is summarized in Table G. A total of 21 municipal treatment plants were completed from January 1, 1947 through 1950. These plants were designed to serve a population of 194,000. During this period six industrial waste treatment facilities were constructed to treat wastes having a population equivalent of more than 126,800. The amounts of waste treated by two of these plants is unknown. It is significant that all of these industrial treatment facilities were constructed in 1949 and 1950.

During the first half of 1951 three additional municipal waste treatment plants, having a design population of 1,400, and four new industrial waste treatment facilities have been completed. Two of the industrial plants treat wastes having a population equivalent of 85,800 (National Container Corporation, Jacksonville - P.E. 84,100 and Frye Roofing Company, Jacksonville - P.E. 1700). The third industry, Humphrey Gold Corporation,

Jacksonville, produces waste primarily of an inorganic nature (silt), and the fourth produces organic waste of undetermined strength.

The State Board of Health has water pollution control authority in Florida. The sections of the code which provide this authority are intermingled with those sections dealing with other phases of general public health and duties of the State Health Officer. These sections are in Title 27, Chapter 381, Florida Statutes Annotated, and more specifically Sections 381.43-389.08 inclusive. Two other State agencies have limited authority in the field of water pollution. The Commission of Game and Fresh Water Fish has the power and authority to enforce the prohibition against the placing of certain deletorious substances or forces into fresh waters whereby fish are or may be injured (Sec. 372.75, 372.07). The State Board of Conservation is given authority to promulgate regulations to prevent action in one watershed, area or location which will adversely affect the surface or underground water supply in another area (Sec. 373.27 (3)).

The State Board of Health has general control and supervision over underground water, all lakes,

rivers, streams, canals, ditches, and coastal waters insofar as their pollution may affect public health or impair the interest of the public; also general supervision and control over all water supply, sewerage, refuse, and sewage treatment systems (Sec. 381.43).

The State Board of Health has been designated the State Water Pollution Control Agency for Florida by the Surgeon General of the U.S. Public Health Service under the Federal Water Pollution Control Act.

TABLE C

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number of Municipalities Served *	Number of Treatment Plants	Population Served
Primary **	1/ 10	11	35,400
Secondary **	2/ 21	22	71,100
No Treatment	3/ 12	XXXX	3/ 194,000

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

** Includes "minor" treatment plants under Primary Treatment and "intermediate" treatment plants under Secondary Treatment for purposes of this table.

1/ Includes one military establishment for which population served data is not available.

2/ Includes two military establishments for which population served data is not available.

3/ Includes Mayport (700 population) which has no municipal sewer system and was not included in Table A.

TABLE D

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

Type Industry	Number of Plants	Number of Industrial Plants Having: Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & Kindred Products	99	5	93	1
Lumber & Wood Products	1	1	0	0
Paper & Allied Products	2	1	1	0
Chemicals & Allied Products	12	2	10	0
Products of Petroleum & Coal	1	1	0	0
Other Mining Industries	1	1	0	0
Miscellaneous	7	0	7	0

* Industries having separate outlets discharging wastes directly to watercourse.

TABLE E

ADEQUACY OF EXISTING TREATMENT FACILITIES

MUNICIPAL *

Number of Municipal Treatment Facilities*	Adequacy with Relation to:					
	Capacity			Operation		
	Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
33	26	6	1	29	3	1

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

TABLE F

ADEQUACY OF EXISTING TREATMENT FACILITIES

INDUSTRIAL *

Number of Industrial Treatment Facilities*	Adequacy with Relation To: Capacity			Operation		
	Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
** 10	3	*** 3	4	3	3	4

* Industries having separate outlets discharging wastes directly to watercourse.

** Plymouth Citrus Products Cooperative and Minute Maid, Inc. of Plymouth combine their wastes for treatment at a single plant. For that reason the total number of treatment facilities is one less than the number in Table D, column 3, entitled "Number of Industrial Plants Having Treatment Facilities".

*** Includes two industries requiring new plants and one plant serving two industries (see foot note**) for which the pollution abatement need is undetermined.

TABLE G

PROGRESS IN CONSTRUCTION OF POLLUTION

ABATEMENT FACILITIES

Year	Sewage Treatment Plants Completed	Design Population	Waste Treatment Plants Completed	Amount of Waste Treated (In terms of Equiv. No. People)
1946	0	-	0	-
1947	1	7,000	0	-
1948	2	8,900	0	-
1949	* 7	20,600	3	121,400
1950	11	157,500	** 3	5,400
*** 1951	3	1,400	** 4	85,800

* Includes Industrial School for Girls at Ocala which has a design population of 200. This institution is now closed and is not at present a source of pollution.

** Amount of waste from two plants is undetermined.

*** Plants completed as of June 1, 1951.

POLLUTION PREVENTION MEASURES REQUIRED

Municipal waste treatment needs are summarized in Table H and their locations are indicated on Map No. 6. There are 16 municipal pollution abatement projects required to serve a combined population of 220,300. These include 14 new treatment plants at Jacksonville, Sanford, Palatka, East Palatka, Green Cove Springs, Orange Park, Gainesville, Mt. Dora, Eustis, Umatilla, Wildwood, Hastings, Mayport, and Neptune Beach (Table L). An addition to the existing primary treatment plant now serving 3,500 people is required at Leesburg. Enlargement of the plant at Lakewood Subdivision in Duval County, now receiving the waste from 1,500 people, is required to serve a population of 4,000. No projects are required at 27 municipalities where satisfactory existing municipal treatment facilities serve a sewered population of more than 80,200 (Data concerning the population served at two of these 27, the Jacksonville Naval Air Station and Cecil Field, are not available). The needs of one municipality, Green Cove Springs Naval Base, are undetermined.

Disregarding the one municipality from which the project requirements are not known, the information available indicates that approximately 61 percent of the sewered municipalities adequately treat their wastes. However, considering this data from the viewpoint of sewered population, only about 27 percent of the domestic sewage of the basin is receiving adequate treatment. The construction of a municipal sewage treatment plant at Jacksonville, which as a sewered population of 170,000, would very materially improve the situation presented by these data.

Industrial waste abatement needs are presented in Table I and on Map No. 7. Of the 123 industries in the basin which discharge wastes directly to watercourses or to subsurface drainage, the treatment requirements of only 8 (6.5 percent) are known. All of these require new treatment works (Table L). These are the Hudson Pulp and Paper Corporation near Palatka, the Florida Soap Corporation on Doctor's Inlet, and the following located in Duval County at the outskirts of Jacksonville: the Reasor-Lewis Corporation, a naval stores extraction plant; the Goldman Packing Company,

a meat packer; the Jacksonville Processing Company, a naval stores extraction plant; the Wootton Fibre Company, a palmetto fibre processing plant; the Jacksonville Brewing Company; and the Glidden Company, Naval Stores Division.

Seven industries (5.7 percent) require no further treatment of their wastes under the conditions existing at the writing of this report. They are the National Container Corporation, the Humphrey Gold Corporation, the American Norit Company, the King Edward Cigar Company, the Gibbs Company, the Wilson and Toomer Fertilizer Company, and the Frye Roofing Company all of Jacksonville or its immediate vicinity.

The treatment requirements of 108 (87.8 percent) of the industries which discharge wastes directly to the water resources of the basin are undetermined. An active survey of industrial waste treatment abatement needs now being conducted by the Florida State Board of Health is intended to supply most of the information now lacking.

Information in regard to the current status of municipal action on pollution abatement needs is

presented in Table J, and similar data in regard to industrial action is given in Table K. Two municipalities (Mt. Dora and Eustis) are actively planning new treatment plants. A new plant is under construction at Gainesville which will provide secondary treatment for municipal and a large part of the industrial waste of the city. This plant will have a design population of 50,000. An enlargement to the treatment plant at Lakewood Subdivision in Duval County, currently under construction, will provide that municipality with secondary treatment. The status of action of five other municipalities is undetermined and seven are inactive.

Four industries are actively planning pollution abatement works. These are the Hudson Pulp and Paper Corporation, the Reasor-Lewis Corporation, the Wootton Fibre Company, and the Fosgate Growers Cooperative at Forest City. Pollution abatement needs at this last industry are as yet undetermined, but a pilot plant type trickling filter is being operated there to determine what the treatment needs may be.

In Table L are listed alphabetically all

municipalities and industries known to need improvements for the abatement of pollution. Industries discharging wastes to municipal sewers also are included. Although the data are incomplete regarding the combined population equivalent of wastes from municipalities and industries needing improvements for pollution abatement, it is indicated that these wastes have a population equivalent greater than 341,000.

It is estimated that the initial cost of required municipal treatment plants in the St. Johns River Basin will be approximately $9,777,000. This estimate includes treatment of industrial wastes now discharged to municipal sewerage systems. The cost of intercepting sewers is estimated at about $11,732,400. Based on very limited data, it is expected that initial costs of industrial waste treatment at the eight industries discharging wastes directly to watercourses where pollution abatement needs are known, will be between $500,000 and $840,000. The total initial cost of required municipal and industrial waste treatment facilities, including necessary intercepting sewers but excluding collection systems, is estimated to be between $22,000,000

to $23,000,000.

Recognizing that these expenditures will take place over a number of years, the estimated costs will be increased due to added factors. These include additional annual obsolescence and rehabilitation requirements, needs of communities installing new sewer systems, normal population increases and industrial expansion, as well as allowances for presently undetermined needs at 108 industries.

The above described pollution prevention measures required have been determined on the basis of available data. Much further information must be gathered, especially concerning the abatement needs of industries discharging wastes directly to the watercourses, if the water resources of the basin are to be protected adequately.

TABLE H

WASTE TREATMENT NEEDS - MUNICIPAL*

Needs	Number	Population Served by Facilities
New Plant	** 14	215,300
Enlargement or Additions to Existing Plant	2	5,000
Replace Existing Plant	0	-
No Project Required	*** 27	80,200
Undetermined	1	Not Known

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

** One new plant at Gainesville will replace two primary treatment plants classified as unsatisfactory in capacity and operation, one plant at Wildwood classified as unsatisfactory in capacity is considered to require a new plant rather than a replacement. Includes one plant for Mayport which has no municipal sewers.

*** Includes two military establishments for which population served data is not available. One plant at DeLand classified as unsatisfactory in capacity is said to require no project as the disposal of its wastes is considered satisfactory at the present time.

TABLE I

INDUSTRIAL WASTE POLLUTION ABATEMENT NEEDS*

Needs	Number
New Treatment Plant or Other Pollution Control Measures	** 8
Enlargement or Additions to Existing Plant	0
Replace Existing Plant	0
Connection to Municipal Sewer System	0
No Project Required	*** 7
Undetermined	108

* Industries having separate outlets discharging wastes directly to watercourse.

** Includes six industries now having no treatment facilities and two whose facilities are unsatisfactory as to capacity.

*** Includes four industries not now providing treatment. These are said to require no project as the disposal of their wastes is considered satisfactory at the present time.

TABLE J

CURRENT STATUS OF MUNICIPAL ACTION ON

POLLUTION ABATEMENT NEEDS*

Status of Action	Number of Municipalities*
Inactive	6
Active Planning	2
Final Plans Approved	0
Under Construction	2
Undetermined	7

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

TABLE K

CURRENT STATUS OF INDUSTRIAL ACTION ON

POLLUTION ABATEMENT NEEDS*

Status of Action	Number of Industries*
Inactive	5
Active Planning	4
Final Plans Approved	0
Under Construction	0
Undetermined	107

* Industries having separate outlets discharging wastes directly to watercourse.

TABLE L

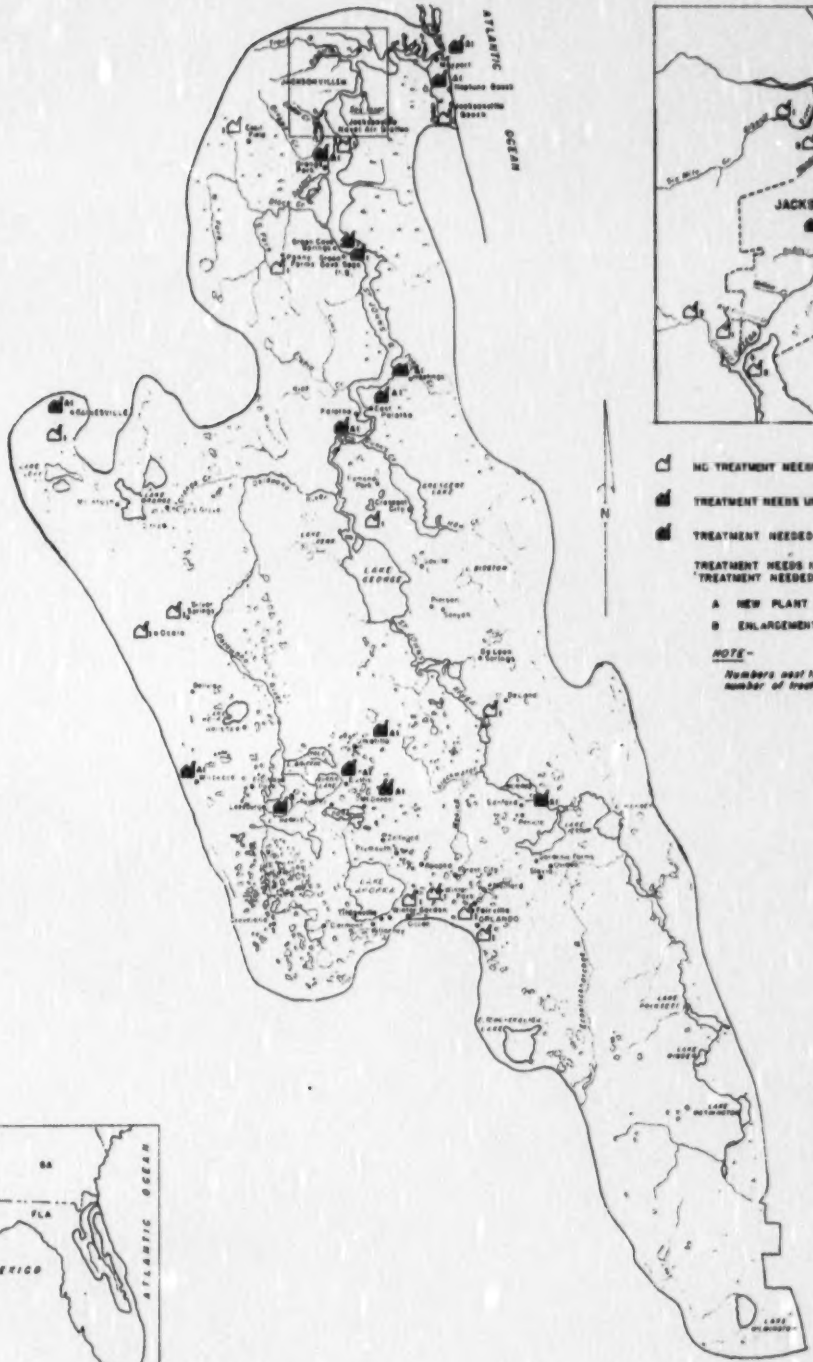
MUNICIPALITIES AND INDUSTRIES NEEDING IMPROVEMENTS
FOR ABATEMENT OF POLLUTION *
June 1, 1951

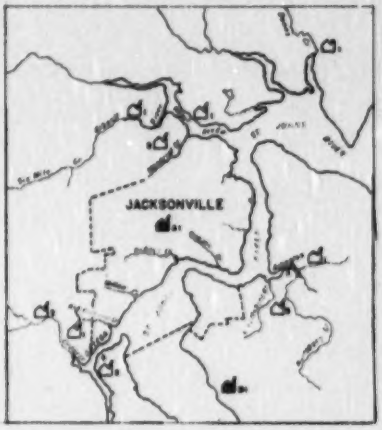
Name and Location	Population Served**	Improvements Needed***	Remarks
Clay County			
Florida Soap Co.	1,900	New Plant	On Doctor's Inlet
Duval County			
Goldman Packing Co.	900	New Plant	On Ribault River
Glidden Co.,Naval Stores Div.	37,200	New Plant	On Moncrief Creek
Jacksonville Brewing Co.	4,000	New Plant	On Moncrief Creek
Jacksonville Processing Co.	1,600	New Plant	On Ribault River
Reasor-Lewis Corp.	300	New Plant	On Cedar Creek
Wootton Fibre Co.	1,500	New Plant	On Ribault River
East Palatka	1,000	New Plant	No treatment provided
Eustis	2,500	NewPlant	Has septic tanks
Schneider's Creamery	Undet'd		No separate outlet
Gainesville	20,000	New Plant	Under construction
Gortner Meat Packing	Undet'd		No separate outlet
Hull & Rattermyer,Dairy and Ice Cream	Undet'd		No separate outlet
C.S.Thomas,Laundry & Dry Cleaning	Undet'd		No separate outlet
O.H.Thomas,Dairy & Ice Cream	Undet'd		No separate outlet
Vogo Hair Manufacturer	Undet'd		No separate outlet
Green Cove Springs	1,500	New Plant	No treatment provided
Hastings	800	New Plant	Has septic tanks
Jacksonville	170,000	New Plant	No treatment provided
Foremost Dairies, Inc.	2,500		No separate outlet
Jacksonville Gas Works	Undet'd		No separate outlet
Jones-Chambliss Co.	3,000		No separate outlet
Roberts Packing Co.	2,800		No separate outlet
Southern Dairies, Inc.	600		No separate outlet
Swift & Co.	Undet'd		No separate outlet
Lakewood Subdivision(Duval Co.)	1,500	Enlargement	Under construction
Leesburg	3,500	Addition	Has septic tanks
Minute Maid, Inc.	11,000		No separate outlet
H.E.Herlong & Co. packers	Undet'd		No separate outlet
Mayport	700	New Plant	Individual septic tanks,no municipal sewers

TABLE L
(CONTINUED)

Name and Location	Population Served**	Improvements Needed***	Remarks
Mt. Dora	600	New Plant	Individual septic tanks, no municipal sewers
Burkhart Products (canning)	Undet'd		No separate outlet
Simpson Fruit Co. (Pkg & canning)	Undet'd		No separate outlet
Neptune Beach	2,400	New Plant	Has septic tanks
Orange Park	300	New Plant	No treatment provided
Palatka	4,800	New Plant	No treatment provided
Southern Provisions Co.	Undet'd		No treatment provided
Putnam County			
Hudson Pulp & Paper Corp.	39,000	New Plant	No treatment provided
Sanford	9,000	New Plant	No treatment provided
Chase & Co. Inc.	Undet'd		No separate outlet
Sanford Fruit Co.	Undet'd		No separate outlet
Standard Growers Assn.	14,400		No separate outlet
Umatilla	400	New Plant	Has septic tank
W.F.Austen & Sons	Undet'd		No separate outlet
Umatilla Citrus Growers Assn.	Undet'd		No separate outlet
Umatilla Fruit Co.	Undet'd		No separate outlet
Wildwood	1,300	New Plant	Has primary treatment
TOTAL	341,000		

* Projects known to be required as of the above date.
** For industries the organic waste load is expressed as population equivalent as measured by Biochemical Oxygen Demand.
*** Industrial wastes now discharged to municipal sewers will be adequately treated on completion of project indicated for municipality.





NO TREATMENT NEEDS

TREATMENT NEEDS UNDETERMINED

TREATMENT NEEDED

TREATMENT NEEDS INDICATED BY LETTERS APPEARING BELOW 'TREATMENT NEEDED' SYMBOLS AS FOLLOWS:

A NEW PLANT

B ENLARGEMENTS OR ADDITIONS TO EXISTING PLANT

NOTE-

Numbers next to symbols or next to code letters represent number of treatment needs in the category designated

ST. JOHNS RIVER BASIN
LOCATION MAP

SCALE OF MILES

10 0 10 20 30 40

ST. JOHNS RIVER BASIN

MUNICIPAL
WASTE TREATMENT NEEDS

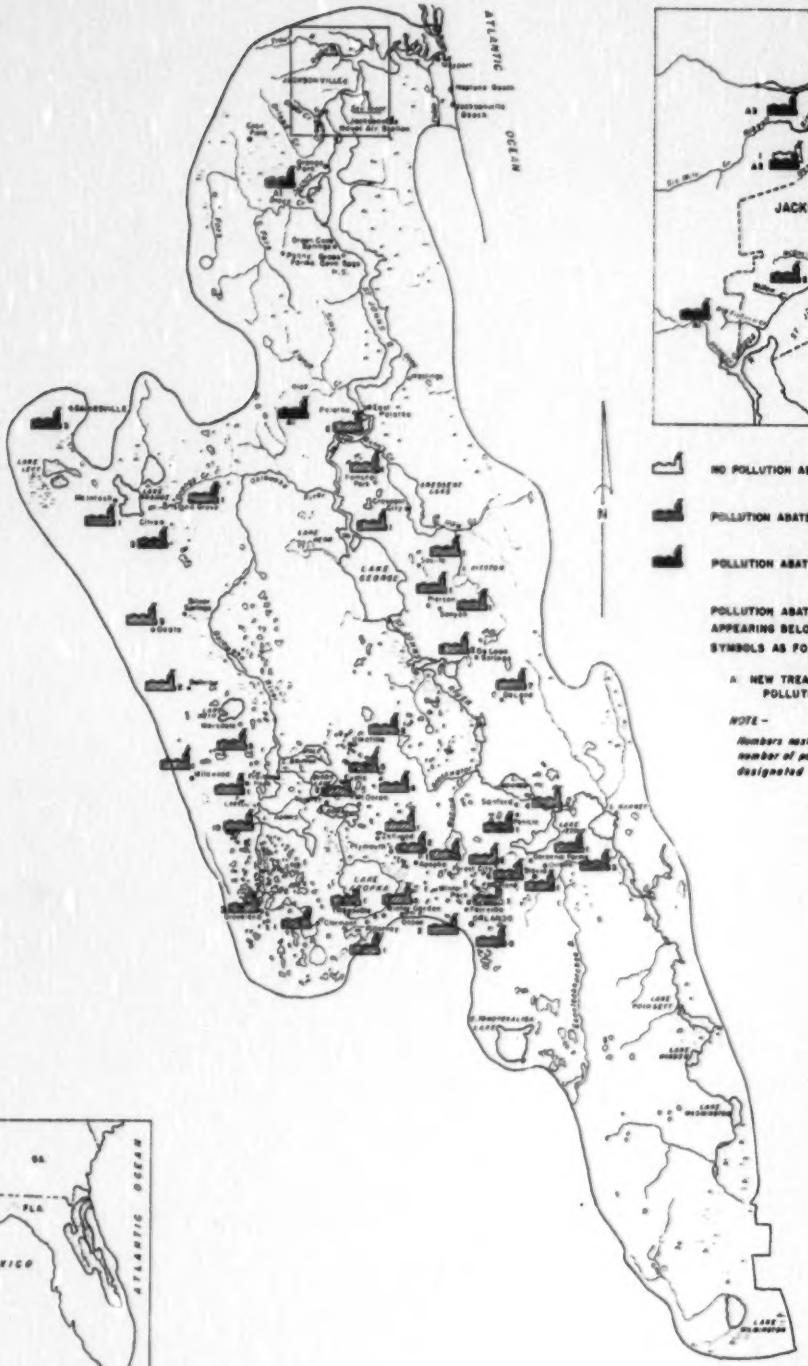
FEDERAL SECURITY AGENCY

Public Health Service

Division of Water Pollution Control

MAP NO. 8

FSA-ATLANTA, GA.



NO POLLUTION ABATEMENT NEEDS

POLLUTION ABATEMENT NEEDS UNDETERMINED

POLLUTION ABATEMENT NEEDED

POLLUTION ABATEMENT NEEDS INDICATED BY LETTERS APPEARING BELOW 'POLLUTION ABATEMENT NEEDED' SYMBOLS AS FOLLOWS:

A. NEW TREATMENT PLANT OR OTHER POLLUTION CONTROL MEASURES

NOTE –

Numbers next to symbols or next to code letters represent number of pollution abatement needs in the category designated

ST. JOHNS RIVER BASIN
LOCATION MAP

SCALE OF MILES

10 0 10 20 30 40

ST. JOHNS RIVER BASIN
INDUSTRIAL
WASTE TREATMENT NEEDS

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 7

FSA-ATLANTA, GA.

A P P E N D I X

BASELINE REPORT ON WATER POLLUTION

St. Johns River Basin

TABLE 1

BASIC DATA ON SOURCES OF MUNICIPAL POLLUTION
ST. JOHNS RIVER BASIN

Name and Location	River Miles Above Mouth or Outlet Stream	Population Served By Sewers	Pop. Equivalent (B.O.D) Untreated Wastes *	Waste Treatment Provided	Adequacy Of Treatment Facilities: Capacity	Adequacy Of Treatment Facilities: Operation	Pop Equivalent (B.O.D) Discharged To Watercourse **	Treatment Needs	Current Status Municipals Action
ST. JOHNS RIVER Florida	SJ								
Econlockhatchee River	196								
Lake Jessup	179								
Sanford	171	9,000	25,000E	None			25,000E	New Plant	Inactive
DeLand	146	3,000	1/ 3,000	Primary	Unsat.	Sat.	1/ 2,400	None	
Oklawaha River	103.5								
Dunn's Creek (Crescent Lake)	89								
Palatka	81	4,800	4,800	None			4,800	New Plant	Inactive
East Palatka	81	1,000	1,000	None			1,000	New Plant	Inactive
Deep Creek	70								
Green Cove Springs	51	1,500	1,500	None			1,500	New Plant	Inactive
Green Cove Sp'gs Navy Base	51	Undet'd	Undet'd	Primary	Undet'd	Undet'd	Undet'd	Undet'd	Undet'd
Black Creek	46								
Orange Park	38	300	300	None			300	New Plant	Undet'd
Jacksonville Naval Air Sta.	33	Undet'd	Undet'd	Secondary	Sat.	Sat.	3,000E	None	
Lakewood Subd'n Duval Co.	31	1,500	1,500	Primary	Unsat.	Sat.	1,200	Enlarge	Under Constr.
Ortega River	29								
Big Fishweir Creek	28.5								
	20								
Jacksonville	to	170,000	170,000	None			170,000	New Plant	Inactive
	18								
Willow Branch	27.5								
McCoys Creek	26.1								
Arlington River	23								
Trout River	18.3								
Dunn's Creek	15								
Pablo Creek	4								
Mayport 2/	3						700	New Plant	Undet'd
Econlockhatchee River	E								
Little Econlockhatchee River	14								
Little Econlockhatchee River	LE								
Orlando	11	40,000	1/ 40,100	Secondary	Sat.	Sat.	1/ 8,000	None	
Lake Jessup	LJ								
Snake Run Creek	9								
Snake Run Creek	SR								
T.B. Hospital Orlando	16	1,200	1,200	Primary	Sat.	Sat.	800	None	
Winter Park	11	4,000	4,000	Secondary	Sat.	Sat.	800	None	
Oklawaha River	O								
Winter Garden	110	2,000	1/ 2,000	Secondary	Sat.	Sat.	1/ 400	None	
Mt. Dora	96	600	1/ 600	None 3/			1/ 600	New Plant	Act Planning
Eustis	91	2,500	1/ 2,500	None 3/			2,500	New Plant	Act. Planning
Umatilla	90	400	1/ 400	None 3/			1/ 400	New Plant	Undet'd
Leesburg	86.5	3,500	1/ 14,500	Primary	Unsat.	Sat.	1/ 11,600	Addition	Undet'd
Wildwood	82	1,300	1,300	Primary	Unsat.	Unsat.	1,200	New Plant	Undet'd
Ocala	58	9,500	1/ 11,500	Secondary	Sat.	Sat.	1/ 2,300	None	
Ind.School for Girls Ocala	58	4/None		Secondary			4/	None	
Silver Springs Run	58								
Orange Creek	25								
Silver Springs Run	SS								
Silver Springs	9	300	300	Secondary	Sat.	Sat.	Negligible	None	
Orange Creek	OC								
Gainesville	40			Primary	Unsat.	Unsat.			
Gainesville	40	20,000	1/ 20,000	Primary	Unsat.	Unsat.	1/ 18,000	New Plant	Under Constr.
Univ. Florida Gainesville	40	6,600	8,600	Secondary	Sat.	Sat.	1,700	None	
Dunn's Creek (Crescent Lake)	D(CL)								
Crescent City	15.3	400	400	Primary 6/	Sat.	Sat.	300	None	
Deep Creek	D								
Hastings	3	800	800	None 3/			800	New Plant	Undet'd
Black Creek	B								
North Fork Black Creek	13								
Branch Black Creek	5.7								
North Fork Black Creek	NF								
Branch N. Fork Black Creek	9								
Branch North Fork Black Cr.	BNF								
Cecil Field, USN Duval Co.	6	Undet'd	Undet'd	Secondary	Sat.	Sat.	200E	None	
Branch Black Creek	BBC								
Penney Farms	9	200	200	Secondary	Sat.	Sat.	Negligible	None	
Ortega River	OR								
Cedar Creek	2								
Wesconnett Sch.N Duval Co.		200	200	Secondary	Sat.	Sat.	Negligible	None	
Wesconnett Sch.W Duval Co.		600	600	Secondary	Sat.	Sat.	Negligible	None	
Jacksonville		5/	5/	None			5/	5/	
Cedar Creek	C								
Marietta School Duval Co.		800	800	Secondary	Sat.	Sat.	Negligible	None	
Lake Shore Ter. Duval Co.		900	900	Primary	Sat.	Sat.	600	None	
Big Fishweir Creek	BF								
Glen Laure Sub.Duval Co.		200	200	Secondary	Sat.	Sat.	100	None	
Willow Branch	W								
Jacksonville		5/	1/ 2,500	None			1/ 2,500	5/	

TABLE 1

BASIC DATA ON SOURCES OF MUNICIPAL* POLLUTION

ST. JOHNS RIVER BASIN

Name and Location	River Mile Above Mouth Outfall Stream	Population Served By Sewers	Pop. Equivalent (B.O.D) Untreated Wastes**	Waste Treatment Provided	Adequacy of Treatment Facilities: Capacity	Adequacy of Treatment Facilities: Operation	Pop Equivalent (B.O.D) Discharged To Watercourse**	Treatment Needs	Current Status Municipal* Action
McCoys Creek	MC								
Jacksonville		5/	1/ 6,400	None			1/ 6,400	5/	
Arlington River Duval Co.	A								
Southside Estates School		500	500	Secondary	Sat.	Sat.	Negligible		
Little Pottsburg Creek	0.3								
Little Pottsburg Creek	LP								
Rodney Subdivision		200	200	Secondary	Sat.	Sat.	Negligible	None	
Spring Park Manor		600	600	Secondary	Sat.	Sat.	Negligible	None	
Spring Park Manor		400	400	Secondary	Sat.	Sat.	Negligible	None	
Trout River	T								
Riverview School Duval Co.		700	700	Secondary	Sat.	Sat.	Negligible	None	
Ribault River	3								
Moncrief Creek	1.8								
Jacksonville		5/	5/	None			5/	5/	
Ribault River	R								
Lake Forest Sch.Duval Co.		600	600	Secondary	Sat.	Sat.	Negligible	None	
Moncrief Creek Duval Co.	M								
New College Park School		500	500	Secondary	Sat.	Sat.	Negligible	None	
Grand Park School		500	500	Secondary	Sat.	Sat.	Negligible	None	
Dunn's Creek	DC								
Oceanway School Duval Co.		700	700	Secondary	Sat.	Sat.	Negligible	None	
Pablo Cr(Intracoastal Waterway)	P								
Jacksonville Beach	10 to 5	3,600	3,600	Primary	Sat.	Sat.	2,300	None	
Neptune Beach		2,400	2,400	None 3/			2,400	New Plant	Inactive

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers or other population centers.

** Includes industrial wastes discharged into municipal sewerage systems. Figures of more than 50 are rounded off to the nearest hundred. Those less than 50 are indicated as "negligible".

1/ Additional P.E. contributed to municipal sewers is unknown.

2/ Mayport has no sewer system. Private septic tanks discharge individually to the watercourse.

3/ Has a septic tank which is considered non-functional, or practically so, by the Bureau of Sanitary Engineering, Florida State Board of Health.

4/ Not at present a source of pollution. School closed indefinitely.

5/ Data here called for is included in figure given at first reference to Jacksonville above.

6/ Has a septic tank with four compartments.

E Estimated figure.

TABLE 2

BASIC DATA ON SOURCES OF INDUSTRIAL POLLUTION

ST. JOHNS RIVER BASIN

Name and Location	River Miles Above Mouth Outlet Stream	Type Industry	Type Waste Produced	Treatment Or Other Pollution Control Measures			Pop. Equivalent (B.O.D) Discharged To Watercourse **	Pollution Abatement Needs	Current Status Industrial Action
				Degree	Adequacy				
					Capacity	Operation			
ST. JOHNS RIVER Florida	SJ								
Lake Jessup	179								
L.A. Borumley & Sons, (precooling) Sanford	171	Food	Organic	None				Undet'd	Undet'd
American Fruit Growers (precooling) Sanford	171	Food	Organic	None				Undet'd	Undet'd
Sanford-Oviedo Truck Growers, Inc. Sanford	171	Food	Organic	None				Undet'd	Undet'd
Wekiva River	163								
Braun Fruit Packers DeLand	146	Food	Organic	None 1/				Undet'd	Undet'd
Perkins Growers, Inc DeLand	146	Food	Organic	None				Undet'd	Undet'd
Pitt Cole Co(pkrs.) DeLand	146	Food	Organic	None				Undet'd	Undet'd
Caffin Launderette DeLand	146	Misc	Organic	None				Undet'd	Undet'd
Alexander Baird Co., (pkrs.) DeLand	146	Food	Organic	None				Undet'd	Undet'd
Parrish Fruit Co. (pkrs.) DeLand	146	Food	Organic	None				Undet'd	Undet'd
Norris Alexander, Inc. (canners) 1/ DeLand	146	Food	Organic	None 1/				Undet'd	Undet'd
Lakes Dexter, Woodruff & Spring Garden	134.5								
Alexander Baird Co. (pkrs.) Pierson	124	Food	Organic	None				Undet'd	Undet'd
McBride Packing Co. Senyah	124	Food	Organic	None				Undet'd	Undet'd
John A. Parker (packer) Seville	119	Food	Organic	None				Undet'd	Undet'd
Oklawaha River	103.5								
Dunn's Creek (Crescent Lake)	89								
Gale Fish Packing Co. Palatka	81	Food	Organic	None				Undet'd	Undet'd
Monroe Packing Co. Palatka	81	Food	Organic	None				Undet'd	Undet'd
Rice Creek	78								
Doctor's Inlet	39								
Ortega River	29								
McCoy Creek	26.1								
Hogan Creek	25								
Arlington River	23								
National Container Corp. Jacksonville	20	Paper	Organic	Pri. or equiv.	Sat.	Sat.		None	
King Edward Cigar Co. Jacksonville		Misc.	Organic	None			100E	None	
Gibbs Corp. Jacksonville		Misc.	Organic	None			200E	None	
Eppinger & Russel Co., (creosoting) 4/ Jacksonville		Chemical	Inorg.	None			Negligible	None	
Niagra Chemical Div. Food Mach. Corp. 4/ Jacksonville		Chemical	Inorg.	None			Negligible	None	
Armour Fertilizer Works 4/ Jacksonville		Chemical	Inorg.	None			Negligible	None	
Wilson & Toomer Fertilizer Co. Jacksonville		Chemical	Organic	None			200E	None	
Trueman Fertilizer Co. 4/ Jacksonville		Chemical	Inorg.	None			Negligible	None	
Naco Fertilizer Co. Jacksonville		Chemical	Undet'd	None				Undet'd	Undet'd
Jacksonville Coca Cola Co. Jacksonville		Food	Organic	None			Negligible	None	
U.S. Gypsum Co. Jacksonville		Misc.	Inorg.	None			Negligible	Undet'd	Undet'd
Frye Roofing Co Jacksonville		Petro-leum	Organic	Pri. or equiv.	Sat.	Sat.		None	
Trout River	18.3								
Lake Jessup	LJ								
L.D. Plante, (rendering) Gardenia Farms	9	Chemical	Organic	None				Undet'd	Undet'd
Lake Charm Fruit Co., (precooling) Oviedo	9	Food	Organic	None			1,000E	Undet'd	Undet'd
Nelson Corp., (packers) Oviedo	9	Food	Organic	None				Undet'd	Undet'd
Florida Precool Co. Oviedo	9	Food	Organic	None			3,600E	Undet'd	Undet'd
A. Duda & Sons Corp. Slavia	9	Food	Organic	None				Undet'd	Undet'd
Newbeck Slaughter House Penicle	9	Food	Organic	None 5/				Undet'd	Undet'd
J. Dingfelder, (precool) Sanford	9	Food	Organic	None				Undet'd	Undet'd
Snake Run Creek	9								

TABLE 2

BASIC DATA ON SOURCES OF INDUSTRIAL POLLUTION

ST. JOHNS RIVER BASIN

Name and Location	River Miles Above Mouth Outlet Stream	Type Industry	Type Waste Produced	Treatment Or Other Pollution Control Measures			Pop. Equivalent (B.O.D) Discharged To Watercourse **	Pollution Abatement Needs	Current Status Industrial Action
				Degree	Adequacy				
					Capacity	Operation			
Snake Run Creek	SR								
Atlantic Co.(brewery) 3/ Orlando	20	Food	Organic	None				Undet'd	Undet'd
Stauffler Chemical Corp. 3/ 4/ Orlando		Chemical	Inorg.	None 1/					
Dr. Phillips,(canners) Orlando		Food	Organic	None 1/			8,500E	Undet'd	Undet'd
Dr. Phillips, (packers) Orlando		Food	Organic	None 1/				Undet'd	Undet'd
Perfection Coop.Dories Orlando		Food	Organic	Pri.or equiv.	Undet'd	Undet'd		Undet'd	Undet'd
Southern Fruit Distrib. (canners) Orlando		Food	Organic	None 1/			7,200	Undet'd	Undet'd
Blue Bell Chemical Co. Orlando	16	Chemical	Organic	None 1/				Undet'd	Undet'd
Calif.Spray Chemical Corp.4/ Fairville		Chemical	Inorg.	None 5/				None	
Babijuice Co.(packers) Fairvilla	15	Food	Organic	None 1/			Negligible	Undet'd	Undet'd
Ames & Haymes(dry cleaners) Winter Park	11	Misc.	Organic	None				Undet'd	Undet'd
C.H.C. Van Pelt Winter Park	11	Food	Organic	None 5/				Undet'd	Undet'd
Square Deal Fruit Co. Winter Park	11	Food	Organic	None 1/			Negligible	None	
Gentile Bros.,(packers) Winter Park	11	Food	Organic	None 1/			100E	Undet'd	Undet'd
N.S. DeForest Co.(packers) Maitland		Food	Organic	None 1/				Undet'd	Undet'd
Clifton Groves Packing Co. Maitland		Food	Organic	None 1/				Undet'd	Undet'd
Nick Belitz, (packer) Maitland		Food	Organic	None 1/				Undet'd	Undet'd
Frostie Root Beer Maitland		Food	Organic	None 5/				Undet'd	Undet'd
Amer. Fruit Growers, Inc. (packers) Maitland		Food	Organic	None 5/				Undet'd	Undet'd
F.B. Stone, (packer) Maitland	9	Food	Organic	None 1/				Undet'd	Undet'd
Wekiva River	W								
Branch Wekiva River	11								
Branch Wekiva River	BW								
Fosgate Growers Coop. (marmalade cannery) Forest City	10	Food	Organic	Pri.or equiv.	Undet'd	Undet'd	5,400E	Undet'd	Undet'd
Fosgate Growers Coop. (Concentrate Plant) Forest City	10	Food	Organic	Pri.or equiv. 6/	Undet'd	Undet'd		Undet'd 5/	Act.Planning
Lakes Dexter, Woodruff & Spring Garden	LD								
Hodnay Fruit Co.(packers) De Leon Springs	9	Food	Organic	None				Undet'd	Undet'd
Theo.Strawn, Inc.(packer) De Leon Springs	9	Food	Organic	None				Undet'd	Undet'd
Oklawaha River	O								
Pomona Products Corp. Clermont	116	Food	Organic	None 1/				Undet'd	Undet'd
Grove Fruit Packing Co. Groveland	112	Food	Organic	None 1/				Undet'd	Undet'd
B & W Canning Co. Groveland	112	Food	Organic	None 1/			5,700E	Undet'd	Undet'd
B & W Corp. (packers) Groveland	112	Food	Organic	None				Undet'd	Undet'd
McCaffrey (packers) Killarney	111	Food	Organic	None				Undet'd	Undet'd
S.Lake Apopka Citrus Growers Assn.Tildenville	111	Food	Organic	None 1/				Undet'd	Undet'd
Winter Garden C.O. Assn. Winter Garden	110	Food	Organic	None			1,600E	Undet'd	Undet'd
Britt Fruit Co. (packers) Winter Garden	110	Food	Organic	None				Undet'd	Undet'd
Roper Growers Coop. Winter Garden	110	Food	Organic	None			Negligible	None	
R.D. Keene, Inc. Winter Garden	110	Food	Organic	None				Undet'd	Undet'd
Heller Bros.(packers) 3/ Winter Garden	110	Food	Organic	None 5/				Undet'd	Undet'd
Winter Garden Citrus Prod.Coop.Winter Garden	110	Food	Organic	None			3,600E	Undet'd	Undet'd

TABLE 2

BASIC DATA ON SOURCES OF INDUSTRIAL POLLUTION

ST. JOHNS RIVER BASIN

Name and Location	River Miles Above Mouth Outlet Stream	Type Industry	Type Waste Produced	Treatment Or Other Pollution Control Measures			Pop. Equivalent (B.O.D) Discharged To Watercourse **	Pollution Abatement Needs	Current Status Industrial Action
				Degree	Adequacy				
					Capacity	Operation			
Maguire Veg. & Fruit Coolers Ocoee	109	Food	Organic	None			2,100E	Undet'd	Undet'd
Fred Hodes,(packer) Ocoee	109	Food	Organic	None 1/				Undet'd	Undet'd
Apopka Fruit Co.,(packers) Apopka	106	Food	Organic	None			700E	Undet'd	Undet'd
Plymouth Citrus Prod. Coop. Plymouth	105	Food	Organic	Primary	Unsat.	Unsat.	80,400	Undet'd	Undet'd
Minute Maid, Inc.Plymouth	105	Food	Organic	Primary 7/	Unsat.	Unsat.	40,200	Undet'd	Undet'd
Zellwood Fruit Distrib. Zellwood	97	Food	Organic	None 5/				Undet'd	Undet'd
W.R. Shriner (packer) Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
Wayside Packing House Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
Dr. C.M. Tower,(packer) Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
Lewis Carroll Packing House Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
Hadlock Fruit Co.(packer) Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
Mt. Dora Growers, Coop., (packer) Mt. Dora	96	Food	Organic	None 5/				Undet'd	Undet'd
J.E. Shofner,(packer) Tavares	91	Food	Organic	None				Undet'd	Undet'd
Coop.Lake Region Pkg.Assn. Tavares	91	Food	Organic	None 5/				Undet'd	Undet'd
J. Mulholland (packer) Eustis	91	Food	Organic	None 5/				Undet'd	Undet'd
B.& B. Packing House Eustis	91	Food	Organic	None			Negligible	None	
Gardner & Testerman(packer) Eustis	91	Food	Organic	None 5/			100E	Undet'd	Undet'd
Livingston Fruit Co. (packers) Eustis	91	Food	Organic	None 5/				Undet'd	Undet'd
Doc Mon Packing House Eustis	91	Food	Organic	None				Undet'd	Undet'd
Eustis Packing Co. Eustis	91	Food	Organic	None				Undet'd	Undet'd
Paul W. Bryant, (packer) Umatilla	90	Food	Organic	None 1/				Undet'd	Undet'd
Powers Bros. Dairy Umatilla	90	Food	Organic	None 5/				Undet'd	Undet'd
J.S. Barnes Packing Co. Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Lake County Creamery Leesburg	86.5	Food	Organic	None				Undet'd	Undet'd
Laundry & Dry Cleaners Leesburg	86.5	Misc.	Organic	None				Undet'd	Undet'd
Milam & Milam,(packers) Leesburg	86.5	Food	Organic	None				Undet'd	Undet'd
Pine Ridge Dairy Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Knowles & Co.(packers) Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Leesburg Fruit Co.(packer) Leesburg	86.5	Food	Organic	None 1/				Undet'd	Undet'd
Southern Packing Co.Inc. Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Bruce Floyd (packer) Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Parks Williams (packer) Leesburg	86.5	Food	Organic	None 5/				Undet'd	Undet'd
Monarch Drainage Co. (packers) Wildwood	82	Food	Organic	None				Undet'd	Undet'd
Drexel Dudley (packers) Fruitland Park	82	Food	Organic	None 5/				Undet'd	Undet'd
Ehlers & Wester, (packers) Weirsdale	74	Food	Organic	None				Undet'd	Undet'd
W.H. Kirkland (packer) Weirsdale	74	Food	Organic	None				Undet'd	Undet'd
R.D. Douglas (packer) Weirsdale	74	Food	Organic	None				Undet'd	Undet'd
Weirsdale Packing Co. Weirsdale	74	Food	Organic	None				Undet'd	Undet'd
Boyer Packing Corp. Weirsdale	74	Food	Organic	None 1/				Undet'd	Undet'd
Bellview Growers Packing Co. Bellview	64	Food	Organic	None				Undet'd	Undet'd
W.V. Atshler (packer) Bellview	64	Food	Organic	None 5/				Undet'd	Undet'd
Badger & Wotherspoon (rendering) Ocala	53	Chemical	Organic	None				Undet'd	Undet'd

TABLE 2

BASIC DATA ON SOURCES OF INDUSTRIAL* POLLUTION

ST. JOHNS RIVER BASIN

Name and Location	River Miles Above Mouth Outlet Stream	Type Industry	Type Waste Produced	Treatment Or Other Pollution Control Measures			Pop. Equivalent (D.O.D) Discharged To Watercourse **	Pollution Abatement Needs	Current Status Industrial Action
				Degree	Adequacy				
					Capacity	Operation			
H.S. Camp & Sons(slaughtering) Ocala	58	Food	Organic	None 5/				Undet'd	Undet'd
Cullison & Dees(slaughtering) Ocala	58	Food	Organic	None				Undet'd	Undet'd
Orange Creek	25								
Orange Creek	OC								
C.R. Whitehurst Dairy Gainesville	40	Food	Organic	None				Undet'd	Undet'd
Renderers, Inc. Gainesville	40	Chemical	Organic	None 5/				Undet'd	Undet'd
Cabot Carbon Co. Gainesville	40	Chemical	Organic	Secondary	Undet'd	Undet'd		Undet'd	Undet'd
O.D.Huff Jr., (packer) McIntosh	38	Food	Organic	None 5/				Undet'd	Undet'd
Island Grove Shippers Island Grove	30	Food	Organic	None				Undet'd	Undet'd
Crosby Wartman (packers) Citra	30	Food	Organic	None 1/				Undet'd	Undet'd
A.P. McLeod, (packer) Citra	30	Food	Organic	None				Undet'd	Undet'd
Dunn's Creek (Crescent Lake)	D(CL)								
New & Snyder Crescent City	15.3	Food	Organic	None				Undet'd	Undet'd
A.J. Rinck (packer) Pomona Park	11	Food	Organic	None				Undet'd	Undet'd
Rice Creek	R								
Little Rice Creek	2.5								
Little Rice Creek	LR								
Hudson Pulp & Paper Corp. Putnam Co.	0.6	Paper	Organic	None			39,000	New Plant	Act.Planning
Doctors Inlet	D								
Florida Soap Corp.Clay Co.		Chemical	Organic	None			1,900	New Plant	Inactive
Ortega River	Or								
Cedar Creek	2								
Cedar Creek	C								
Reasor-Lewis Corp.(naval stores) Duval Co.		Chemical	Organic	None			300	New Plant	Act. Planning
Seaboard A.M. Shops 4/ Jacksonville		Misc.	Inorg.	None			Negligible	Undet'd	Undet'd
McCoys Creek	MC								
Ferris & Co.Jacksonville		Food	Organic	Undet'd				Undet'd	Undet'd
Atlantic C.L. R.R. Shops Jacksonville		Misc.	Organic	None			200E	Undet'd	Undet'd
Fram Inc. Jacksonville		Misc.	Organic	None			Negligible	Undet'd	Undet'd
Public Quick Freeze Jacksonville		Food	Organic	None			Negligible	Undet'd	Undet'd
Great A.& P. Co. Jacksonville		Food	Organic	None			Negligible	Undet'd	Undet'd
Hogan Creek	H								
Self Service Laundromat Jacksonville		Misc.	Organic	None			Negligible	Undet'd	Undet'd
Arlington River	A								
Humphrey Gold Corp. Jacksonville		Mining	Inorg.	Pri.or equiv.	Sat.	Sat.		None	
Trout River	T								
Ribault River	3								
Monerief Creek	1.5								
Ribault River	R1								
Goldman Pkg.Co.Duval Co.		Food	Organic	None			900	New Plant	Inactive
Jacksonville Processing Co. (naval stores)Duval Co.		Chemical	Organic	None			1,600	New Plant	Inactive
Wootton Fibre Co.Duval Co.		Wood	Organic	Pri. or equiv.	Unsat.	Unsat.	1,500	New Plant	Act. Planning
Southern Rwy. Shops Jacksonville		Misc.	Inorg.	None			Negligible	Undet'd	Undet'd
Monerief Creek	M								
Jacksonville Brewing Co. Duval Co.		Food	Organic	None			4,000	New Plant	Inactive
Glidden Co. Naval Stores Div. Duval Co.		Chemical	Organic	Pri.or equiv.	Unsat.	Unsat.	37,200	New Plant	Inactive
American Norit Co.Duval Co.		Chemical	Organic	None			100	None	

* Industries having separate outlets and discharging wastes directly to watercourse.

** Industries producing organic wastes with P.E. discharged to streams of less than 50 are indicated as "negligible" and are not considered in Tables B,D,F,G,I,K, and L unless so indicated by footnote. Those of more than 50 are rounded off to the nearest hundred.

1/ Septic tank for domestic waste only; industrial waste not treated.

2/ Screening and/or comminution.

3/ Discharges part of waste to municipal sewers.

4/ Minor source of pollution but with P.E. unknown. Not considered in summary tables.

5/ Domestic and industrial waste to septic tank. Considered non-functional, or practically so by the Bureau of Sanitary Engineering, Florida State Board of Health.

6/ A trickling filter (pilot plant type) is being operated to determine pollution abatement needs.

7/ Waste from this plant is combined with that from the Plymouth Citrus Products Cooperative for treatment at a single plant.

E Estimated figure.

FSA-ATLANTA,GA.

TABLE 3

AREA AND POPULATION OF ST. JOHNS RIVER BASIN

County	Area Square Miles	1940 Population				Average Persons Sq. Mile
		Urban	Farm	Rural Non-farm	Total	
Alachua	223	13,757	2,853	3,359	19,969	89.5
Brevard	387		910	2,998	3,908	10.1
Clay	598		1,307	5,161	6,468	10.8
Duval	680	176,631	5,282	24,042	205,955	302.9
Flagler	302		470	1,410	1,880	6.2
Indian River	128		457	1,020	1,477	11.5
Lake	872	7,617	3,867	13,317	24,801	28.4
Marion	1,011	8,986	6,298	7,612	22,896	22.6
Orange	572	44,511	3,750	12,227	60,488	105.7
Osceola	497		561	2,024	2,585	5.2
Putnam	803	7,140	8,167	3,391	18,698	23.3
St. Johns	381		1,014	3,937	4,951	13.0
Seminole	321	10,217	9,051	3,036	22,304	69.5
Sumter	140		1,179	1,581	2,760	19.7
Volusia	697	7,041	2,972	9,329	19,342	27.8
TOTAL	7,612	275,900	48,138	94,444	418,482	55.0

TABLE 4

INDUSTRIAL CHARACTERISTICS OF ST. JOHNS RIVER BASIN*

County	Mfg. Plants 1939	Mfg. Plants 1948**	Products Manuf'd 1939 ($1000)	Value Added by Mfgrs. 1939 ($1000)	Leading Non-Agric. Industry 1939***	Industrial Labor Force 1940(except agric'l)
Alachua	37	41	2,154	838	1	6,587
Brevard	0	0	-	-	-	-
Clay	8	7	238	103	2	1,380
Duval	249	307	53,145	25,018	1	77,870
Flagler	7	3	93	28	2	859
Indian River	0	0	-	-	-	-
Lake	30	106	1,923	1,051	1	6,585
Marion	37	55	2,349	1,189	1	6,846
Orange	70	168	5,871	2,966	3	23,210
Osceola	0	0	-	-	-	-
Putnam	26	48	2,589	1,764	4	4,788
St.Johns	6	13	237	123	1	2,207
Seminole	16	35	1,488	695	3	5,814
Sumter	0	0	-	-	-	-
Volusia	22	28	931	543	1	6,339
TOTAL	508	811	71,018	34,318		142,515

* From County Data Book, U.S. Dept. Commerce, 1947
** From Florida Industrial Directory, 1948, Fla. State Chamber of Commerce
*** 1 - Professional and related services
2 - Forestry (except logging and finishing
3 - Wholesale trade
4 - Saw and planing mills

TABLE 5

AGRICULTURAL CHARACTERISTICS IN ST. JOHNS RIVER BASIN COUNTIES*
1945

County	No. of Farms	Farm Acres	Acres Harvested	Value of Products ($1000)	Principal Source Farm Income	Labor Force*** 1940
Alachua	475	86,103	23,538	1,333	Field crops**	870
Brevard	338	74,928	5,166	1,753	Fruits	486
Clay	330	103,711	3,823	657	Livestock	434
Duval	1,124	57,871	4,826	3,385	Dairy products	1,317
Flagler	59	145,180	3,588	430	Field crops	201
Indian River	188	37,672	5,196	1,583	Fruits	358
Lake	1,455	173,801	38,876	11,209	Fruits	2,319
Marion	1,429	252,866	47,036	3,554	Fruits	2,226
Orange	1,199	263,360	28,168	11,687	Fruits	2,242
Osceola	132	304,894	1,557	685	Fruits	198
Putnam	1,059	133,682	12,015	2,097	Fruits	1,086
St.Johns	311	72,840	7,641	1,863	Field crops	608
Seminole	663	172,624	14,588	8,842	Vegetables	3,290
Sumter	282	42,294	6,215	668	Vegetables	434
Volusia	984	146,549	9,736	3,168	Fruits	1,019
TOTAL	10,028	2,068,375	211,969	52,914		17,088

* From U.S. Census of Agriculture, 1945, U.S. Dept. Commerce, Bureau Census.

** Includes corn, sorghum, small grains, annual legumes, hay, potatoes, cotton, sweet potatoes, tobacco, sugar cane and chufas.

*** From County Data Book, U.S. Dept. Commerce, 1947.

TABLE 6

PUBLIC WATER SUPPLIES IN ST. JOHNS RIVER BASIN, 1949

Supply	Source [1]	Degree of Treatment (Population Served) Complete [2]	Dis-infection [3]	None [4]	Plant Capacity M.G.D.	Average Output M.G.D.
Apopka	W		3,200		1.00	0.165
Arlington	W			750	0.72	0.15
Atlantic Beach	W			725	0.86	0.40
Bellview	S		630		0.13	0.01
Benson Springs	W			40	[8]	[8]
Cassadaga	W			500	0.18	0.03
Clermont	W			2,600	2.45	0.10
Crescent City	W		1,200		0.67	0.10
DeLand	W		11,000		5.00	1.00
Parrish Fruit Co.	W			700	0.50	0.10
Duval County						
Arlington River Hills	W			500	0.37	0.20
Bishop Homes S.D.	W			105	[8]	[8]
C. Brinkley Est.	W			315	[8]	[8]
Brooklyn Supply	W			1,575	[8]	[8]
Carvill Park S.D.	W			160	[8]	[8]
Clifton Well	W			200	[8]	[8]
Eastport Well	W			150	[8]	[8]
Englewood S.D. No.1	W			210	[8]	[8]
Englewood S.D. No.2	W			110	[8]	[8]
Greenfield Manor S.D.	W			280	0.14	0.09
Hart Haven S.D.	W			220	[8]	[8]
Lake Forest S.D.	W		1,400		1.15	[8]
Lakewood S.D.	W		500		1.50	[8]
Lynwood S.D.						
Wesconnett	W			365	[8]	[8]
Oceanway Well	W			400	[8]	[8]
Ortega County System						
. Venetia	W			1,500	0.86	[8]
Riverview System No.1	W			280	[8]	[8]
Riverview System No.2	W			245	[8]	[8]
Ridgeland Gardens	W			325	[8]	[8]
River Hills S.D.						
Riverview	W			400	[8]	[8]
Roosevelt Gardens S.D.	W			525	0.22	[8]
St. Johns Park Wells	W			185	[8]	[8]
San Jose S.D.	W			260	0.50	0.25
Southside Estates	W		2,625		1.15	0.60
Westwood S.D.	W			160	0.07	[8]
Yelvington Water Sys.	W			260	[8]	[8]

TABLE 6

PUBLIC WATER SUPPLIES IN ST. JOHNS RIVER BASIN, 1941

Supply	Source 1/	Degree of Treatment (Population Served)			Plant Capacity M.G.D.	Average Output M.G.D.
		Complete 2/	Dis-infection 3/	None 4/		
Enterprise	W		140		8/	0.02
Eustis	W			5,300	1.44	0.40
Fairfield	W			100	8/	0.005
Fern Park	W		200		0.57	0.020
Fruitland Park	W			550	0.122	0.036
Gainesville	W	22,000			0.95	0.65
University of Florida	W		500		0.26	0.075
Green Cove Springs	W			3,000	1.44	0.20
Groveland	W			900	0.29	0.072
Hastings	W			400	8/	8/
Hawthorn	W			500	0.18	0.045
Holopaw	W			1,000	0.72	0.12
Howey-in-the-Hills	W			250	0.72	0.015
Irvine	W			135	8/	8/
Jacksonville	W		225,700		5/ 98.12	36.94 6/
Jacksonville Beach	W		20,000		2.50	8/
Lady Lake	W			1,180	3.10	0.150
Lake Helen	W			900	0.69	0.20
Lake Maitland	W			450	0.7	0.05
Lake Mary	W			500	8/	8/
Leesburg	W			6,000	2.59	0.60
Longwood	W			400	0.86	0.02
McIntosh	W		300		0.5	0.025
Mayport	W			300	8/	8/
Minneola	W			270	0.22	0.018
Monteverde	W			650	0.72	0.06
Mt. Dora	W		6,000		2.5	0.20
Mt. Plymouth	W			50	0.5	0.06
Neptune Beach	W		3,000		2.10	8/
Ocala	W		10,000		4.9	1.50
Industrial School Girls	W		115		0.73	8/
Oakland	W			7/ 518	0.4	0.025
Oklawaha (Marion W.Co.)	W			300	0.11	8/
(J. W. Nelson)	W			100	8/	8/
Ocoee	W		560		0.79	0.03
Orange City	W			800	0.3	0.09
Orange Park	W			220	8/	8/
Mooshaven Home	W			400	0.29	0.03

TABLE 6

PUBLIC WATER SUPPLIES IN ST. JOHNS RIVER BASIN, 1949

Supply	Source 1/	Degree of Treatment (Population Served) Complete 2/	Dis-infection 3/	None 4/	Plant Capacity M.G.D.	Average Output M.G.D.
Orlando	S & W	85,000			16.0	7.0
T.B.Hospital	W		550		0.36	0.10
Palatka	S	7,500			1.70	0.36
Penney Farms	W			400	0.57	0.05
Pomona Park	W			200	0.045	0.006
Sanford	W		10,800		1.58	0.80
Tavarez	W			1,700	0.58	0.126
Umatilla	W			1,200	0.86	0.10
Wildwood	W			1,500	0.72	0.20
Winter Garden	W		3,400		0.9	0.20
Winter Park	W		10,000		6.0	1.00
Zellwood	W			220	0.04	8/
TOTAL SURFACE SUPPLY		9/ 92,500	630	0	9/ 17.83	9/ 7.370
TOTAL GROUND SUPPLY		22,000	311,190	44,458	158.307	47.423
TOTAL ALL SUPPLIES			470,778		176.137	54.793

1/ S - Surface; W - Wells; G - Springs
2/ Coagulation, Sedimentation, Filtration, Disinfection
3/ Disinfection except that in connection with complete treatment.
4/ Includes minor treatment other than disinfection.
5/ Total capacity of six plants.
6/ Average output of five plants.
7/ Total population, 1940
8/ Not known
9/ Includes population of Orlando (85,000) which also draws from wells. This population is not included under total ground supply.

TABLE 7

ESTIMATED IRRIGATION IN THE ST. JOHNS RIVER BASIN*

County	No. Farms Irrigated 1940	Acres Irrigated 1939**
Alachua	3	66
Brevard	0	-
Clay	0	-
Duval	25	171
Flagler	21	451
Indian River	145	4,075
Lake	121	3,528
Marion	7	418
Orange	157	5,213
Osceola	3	114
Putnam	52	2,136
St. Johns	29	1,124
Seminole	317	6,788
Sumter	25	174
Volusia	41	742
TOTAL	946	25,000

* From 16th Census of U.S., 1940, Irrigation of Agricultural Land. 1942.

** Does not include acreage of fallow land or land in young irrigated crops not harvested.

TABLE 8

COMMERCIAL FISH CATCHES IN THE ST. JOHNS RIVER FROM MARKET REPORTS
VOLUSIA BAR TO THE DUVAL COUNTY LINE*

Species	1942 Pounds	1942 $ Value	1943 Pounds	1943 $ Value	1944 Pounds	1944 $ Value	1945 Pounds	1945 $ Value
Catfishes	2,675,382	535,076	3,056,321	611,284	2,639,568	527,919	3,536,471	707,294
Shad	225,290	89,352	488,535	170,987	671,770	233,120	660,652	231,228
Sunfishes	668,183	172,046	555,206	138,612	907,204	226,801	963,398	240,850
Crabs	427,800	85,740	1,120,428	224,086	933,999	186,780	1,160,762	115,076
Crappie	199,313	59,794	348,399	114,512	247,865	74,360	338,840	101,652
Herring	386,620	38,662	204,340	20,434	359,326	35,933	496,971	49,697
Mullet	11,785	2,357	61,381	12,316	86,747	17,349	82,997	16,399
Eels	26,018	5,203	33,176	6,635	66,884	13,377	58,294	11,658
Sea Trout (gray)	-	-	-	-	-	-	25,000	5,000
Sea Bass (redfish)	11,000	2,750	-	-	5,938	1,188	20,579	4,116
Drum	-	-	-	-	-	-	139	28
Croaker	-	-	-	-	-	-	123	25
TOTAL	4,651,391	990,980	5,867,786	1,298,866	5,919,301	1,316,827	7,344,226	1,483,023
Trash Fish	1,773,300		5,894,559		2,038,787		3,629,753	

*Marshall, Nelson - Preliminary investigations on the effects of commercial fishing on game fish in Lake Okeechobee and the St.Johns River. University of Miami Marine Laboratory, Coral Gables, Florida. July 1946, 19 pp. Unpublished.

TABLE 9

FISHING AND HUNTING LICENSE SALES BY COUNTIES, 1949-50*

County	Fishing		Hunting	
	Resident	Non-resident	Resident	Non-resident
Alachua	6,654	1,831	3,389	18
Brevard	1,359	887	1,302	42
Clay	2,532	391	829	9
Duval	1/ 19,735	589	1/ 5,890	26
Flagler	145	55	390	3
Indian River	596	161	417	10
Lake	4,382	6,169	2,006	45
Marion	4,871	1/ 6,804	3,653	79
Orange	2/ 12,600	3,893	2,686	21
Osceola	1,418	936	743	6
Putnam	1,837	1,768	1,826	14
St. Johns	877	210	1,902	3
Seminole	3,178	738	1,058	15
Sumter	3,228	1,021	1,081	13
Volusia	4,223	1,826	3,496	28
TOTAL	67,635	27,279	30,668	332

1/ Ranks first among the counties of the State in the number of sales.

2/ Ranks second among the counties of the State in the number of sales.

* From Biennial Report, Florida Game and Fresh Water Fish Commission, 1949-50. Data is based on entire counties assuming that purchasers might utilize the licenses by hunting or fishing in the St. Johns River Basin. Resident and non-resident fishermen under 16 or over 65 years of age were not required in 1949-50 to purchase licenses. No license was required by residents of their home counties to fish in fresh waters with natural bait. No license is required to fish in salt water.